THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
May 25, 1987 · Vol. XXI · No. 21 · $2/Copy · $44/Year

COMPUTERWORLD

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IBM carves path to high-end CPUs

Woos 370 users with price/performance boost, graduated MVS/XA fees

BY JAMES CONNOLLY
and CHARLES BABCOCK
CW STAFF

NEW YORK — IBM last week combined its introduction of five small mainframe models with graduated pricing for its MVS/XA operating system.

The two moves will make it more attractive for mid-range 370 architecture users to enter IBM's most advanced production environment, although upgrading from their entry point may put them in a combined hardware-and-software pricing squeeze, observers said.

The new models of the 4381 and 3090, along with the graduated pricing options for MVS/XA, are expected to offer incentives to MVS/XA shops to distribute the operating system in a wider arc through the corporation, moving it down to smaller processors that will frequently be located farther away from the data processing center, analysts predicted.

However, Kimball Brown, an analyst for Dataquest, Inc., a San Jose, Calif., market research firm, termed the new low-end 3090 Model 120E "a real trap" because it provides a lower entry point into the 3090 family but leaves users facing a $535,000 upgrade price and increased software prices if they want to move up a 3090 Model 150E. The 120E is a so-called "Group 30" machine for software pric-

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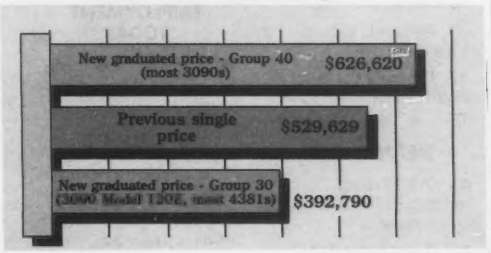
The ups and downs of graduated pricing

IBM's new pricing scheme makes MVS/XA cheaper on small mainframes but more costly at the high end



CW CHART: MITCHELL J. HAYES

More powerful 4381s, sub-$1 million 3090 ward off DEC, PCMs

BY ALAN ALPER
and STANLEY GIBSON
CW STAFF

NEW YORK — IBM last week plugged the performance gap between its 4381 and 3090 processor families by unveiling four more powerful 4381 models and adding its smallest 3090 mainframe.

The mainframes are aimed at bolstering the mid-range of IBM's mainstay 370 architecture and deterring encroachment from Digital Equipment Corp., plug-compatible mainframe rivals and vendors of used IBM equipment. To strengthen customer demand, IBM announced purchase incentives with the new processors.

The next wave

Analysts are anticipating other major IBM mid-range announcements in June. Page 108.

Giving the 4381 line its second mid-life kicker in the last 15 months, IBM added Models 21, 22, 23 and 24, which are approximately 30% more powerful and can accommodate up to twice the memory of existing models, according to IBM.

The new offerings, taken together with the existing Models 11, 12, 13 and 14, offer a sixfold growth range and extend the life of the 4300 family, according to IBM.

The new entry-level 3090, called the Model 120E, is the first 3090 mainframe priced at less than $1 million. It offers between 70% and 80% of the performance of the next largest family member, the Model 150E, at 60% of the price.

The announcements create a performance overlap between the 4381 and 3090 product lines. The high-end 4381 Model 24 is 8% more powerful than the 3090 Model 120E, according to estimates based on IBM claims.

"This beefs up [IBM's] mid-range and puts them in better position against DEC," said Richard Mikita, an analyst with

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HP fills slots in RISC framework

BY JEFFRY BEELER
CW STAFF

CUPERTINO, Calif. — Hewlett-Packard Co. extended its Precision Architecture down to the workstation level for the first time last week, introducing a desktop technical processor that the firm said provides roughly twice the price/performance of its chief rivals.

At the same time, HP made its strongest move yet to dispel lingering doubts about the viability of the Precision Architecture. The company reported wide-ranging advances on the commercial side of its Spectrum development project and said it will begin shipping its HP 3000 Model 930 superminicomputer within three months.

Aimed at the same market as workstations from Sun Microsystems, Inc. and Apollo Computer, Inc., the new HP Model 825SRX joins two other new additions to HP's Unix-based family of technical processors, one of which the firm described as its fastest supermini ever.

In a basic configuration, the high-end 9000 Model 850S offers 10% more throughput than the Digital Equipment Corp. VAX 8550 for half the price, according to Ed Hayes, general manager of HP's technical com-

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Focus to give VAX users window on IBM data

BY CHARLES BABCOCK
CW STAFF

NEW YORK — Information Builders, Inc. is set to introduce a networking product that will allow a Focus user on a Digital Equipment Corp. VAX to query Focus on an IBM mainframe, according to company officials.

The mainframe version of Focus, with more than 2,200 installations, is a well-established means of accessing mainframe data bases. The new link, dubbed Focnet, is likely to become one immediate way of breaking down the data wall between the DEC and IBM data processing worlds. Focus, an information center-oriented fourth-generation language and data base management system, includes a natural-language interface that the firm said allows end users to form queries from English phrases, which can be executed on Focus in use at any processor node.

The unveiling is expected to take place next week at the annual meeting of the Focus users group — Fuse, Inc. — in Palm Desert, Calif. At introduction,

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IIA, ADAPSO plan mega-association

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Information Industry Association (IIA) and ADAPSO, the computer software and services industry association, took the first step last week toward a merger that would create a powerful but diverse coalition of nearly 1,400 vendors.

The executive committees of both trade groups recommended that their respective boards of directors "integrate some key activities for 1987 and 1988 to test the benefits of ultimate merger," according to a letter to the member companies, which was obtained by *Computerworld*.

"The merger of the two memberships would create the largest information-related association of its kind in the nation at a time when the information, computer service and software industries are emerging as the leading American industry," the committees wrote in the letter to the member companies.

A natural consequence

An industry source who is close to the merger negotiations said the talks are a natural consequence of the blurring of lines dividing the various segments of the information technology industry.

ADAPSO represents such companies as Management Science America, Inc., Micropro International Corp., Electronic Data Systems Corp. and Automatic Data Processing, Inc.

The 25-year-old association, which now represents 900 firms, began as the Association of Data Processing Service Organizations to aid service bureaus. The association later expanded into software.

The IIA has operated for 18 years as a trade group for nearly 500 companies involved in the electronic generation and distribution of information.

The IIA represents firms such as Dow Jones & Co., The Dun & Bradstreet Corp., Mead Data Central, Inc., Telerate Systems, Inc. and Frost & Sullivan, Inc.

Voting slated for June

The boards of the two associations are scheduled to meet separately in New York on June 22 to vote on a merger resolution to submit to their respective members in the fall. The delay is intended to allow all members ample opportunity to study the proposal.

To test the concept, the IIA and ADAPSO will first integrate their meetings and chapter activities to determine the potential benefits and problems of a merger, the committees wrote in the letter.

The negotiations were handled by a committee headed by Daniel M. Sullivan, chairman of IIA and president of Frost & Sullivan in New York, and Jay N. Goldberg, chairman of ADAPSO and chairman and chief executive officer of Money Management Systems, Inc. in New York.

BBN moving parallel

Joins Paine Webber in system development work

BY JAMES CONNOLLY
CW STAFF

CAMBRIDGE, Mass. — Bolt Beranek and Newman, Inc. (BBN) joined forces with Paine Webber Development Corp. last week in a $32 million parallel processing development effort.

The companies established a research and development limited partnership, which BBN subsidiary BBN Advanced Computers, Inc. will manage under the three-year agreement.

Paine Webber invested $32 million in exchange for royalty rights to products developed by the partnership.

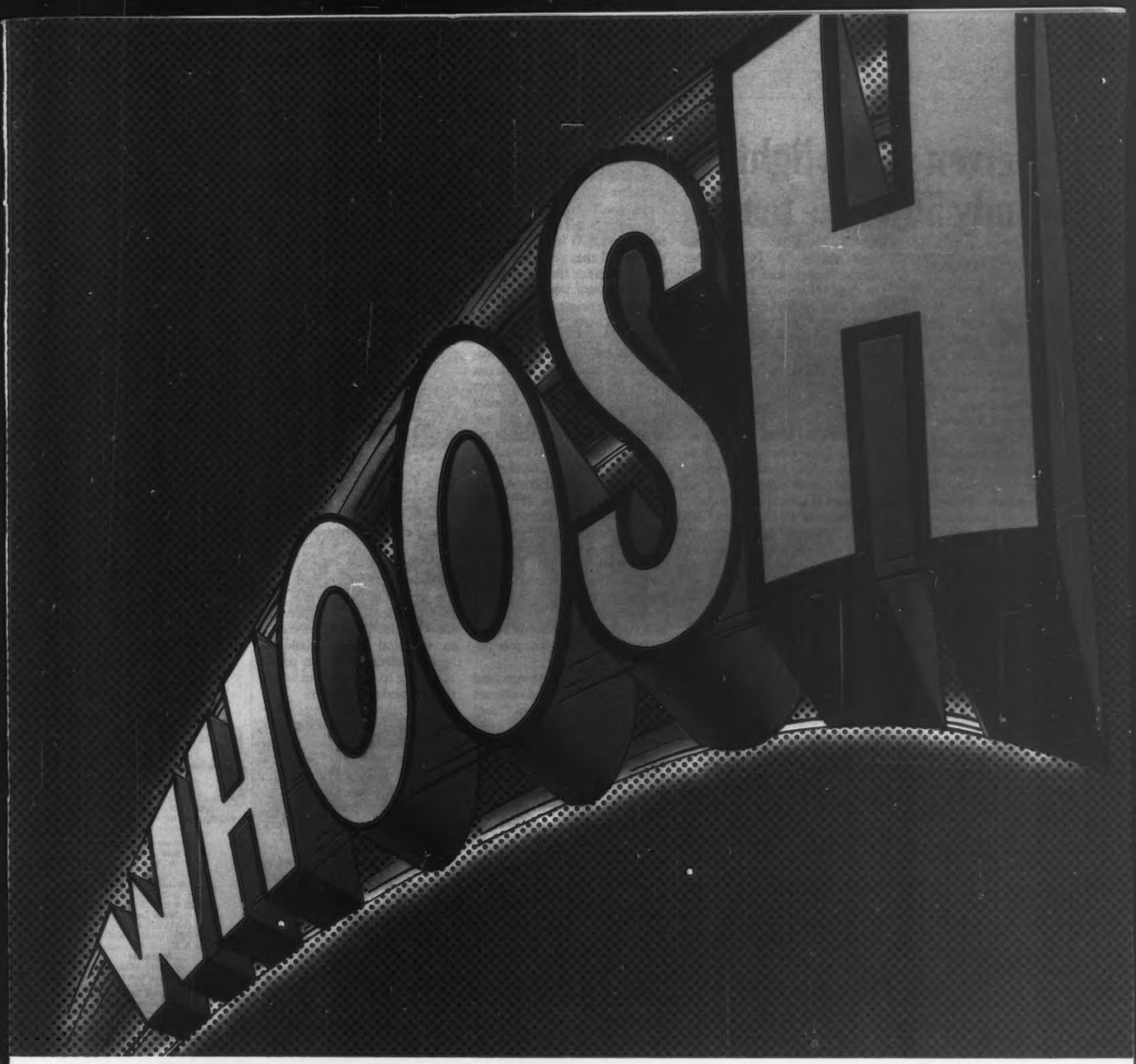
To be based on Butterfly

The products developed by the partnership are expected to be high-performance parallel processing systems that are based on BBN's Butterfly architecture.

"Through this research and development effort, we hope to be able to provide a parallel processor with the look, feel and ease of use of a conventional system but with the power that matches or exceeds that of today's most powerful computers," explained Paul A. Castleman, president of BBN Advanced Computers.

Castleman said the systems to be developed are intended to increase productivity in the areas of complex-system simulation, image understanding and real-time monitoring and control in industrial, engineering and technical markets.

Castleman said the systems will include parallel programming development tools and will support industry-standard software.



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PCs given green light for Indy 500 race teams

BY JEAN S. BOZMAN
CW STAFF

INDIANAPOLIS — As cars roared around the speedway here at speeds of more than 200 miles per hour during the 71st annual Indianapolis 500, their every move was monitored by personal computers.

A Compaq Computer Corp. Compaq 386 was set up to predict pit stops for last year's winner, Bobby Rahal; a trio of Hewlett-Packard Co. Vectras verified sponsor awards; and IBM Personal Computers kept the score and time.

Other computers were also on the scene but were somewhat less visible. A Perkin-Elmer Corp. Professional 7500 workstation verified oil and viscosities, while multiple microprocessors embedded in a car scale weighed the race cars and calculated weight distributions.

One of the newest applications of PC technology at the Indy 500 came in the area of product certification. About $1.15 million of the total $4 million in prize money came from special awards given to the winner and runners-up by vendors of oil, spark plugs and brake pads.

A team of 40 U.S. Auto Club officials monitored each of the 33 cars in the race, noting how product insignia were displayed on cars and uniforms. Before, during and after the race, the compliance data was set to be fed into data base applications built under the Guru expert system product from MDBS, Inc. in Lafayette, Ind. At the race's completion, all that remained to be done was enter the finishing order, and Guru would designate the sponsor prizes.

The compliance system, built in 1986 by MDBS employees who are racing enthusiasts, was also used in connection with last year's Indy 500. But the system only kept track of the product sponsors last year and did not compute the awards based on the use of products. At that time, Guru had not been installed for use at the Indianapolis race.

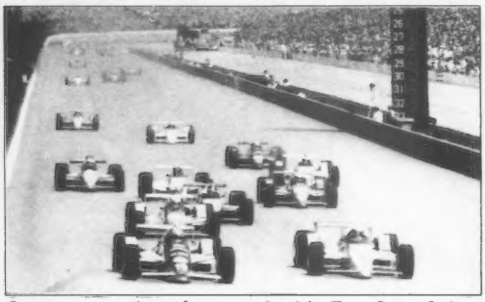
This year, three IBM PC-compatible HP Vectras, each with 640K bytes of memory and 40M bytes of hard-disk storage, kept track of 165 different awards. These awards ranged from a low of $100 for a 15th-place finisher to a high of $75,000, which went to Mario Andretti for gaining the pole position.

"We've got the data input and a complete set of award rules set up in the expert system," said Scott Blocher, an MDBS sales representive who helped program the Guru application. "The inference engine in Guru processes the rule and matches the award to the winner."

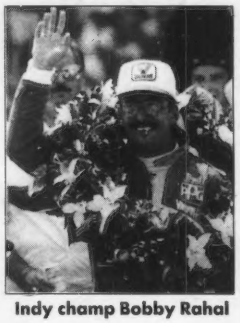
David Bowers, director of computer services for the U.S. Auto Club at the Indy 500, said the use of PCs greatly shortens the time needed to confirm product compliance — and lessens the number of errors in the data.

The end of the race would not mark the end of the verification process, however. "The U.S. Auto Club tears the top 10 cars apart to test the oil and fuel level, the weight of the car and how high it rides off the ground," Bowers said. Any disqualification for technical reasons would require reallocation of the prizes according to the order in which the qualified cars finished.

From the way things have been going, personal computers should continue to play a vital role in the Indy 500. "There is a lot of data we would like to start keeping," Blocher said. "We intend to keep expanding our PC activities and to do more every year."



Computer-monitored *race cars head for Turn One at Indy.*



Indy champ Bobby Rahal

Focus

FROM PAGE 1

Focnet will be for read and instruction executing purposes only, with a release later this year intended to allow data base updates as well.

Gerald Cohen, chairman of Information Builders, said the link, called Focnet, has been built with off-the-shelf components using the LU2.2 communications protocol and DEC's IBM Systems Network Architecture gateway.

Cohen said the link would allow a Focus user on the VAX to formulate a query and transmit it over the link to Focus on the mainframe, where it would be directed against the proper mainframe data base.

Focus is capable of accessing "any mainframe data structure," including IBM's IMS, VSAM and DB2 files, as well as the data base management systems of third-party vendors, such as Datacom/DB from Applied Data Research, Inc., IDMS/R from Cullinet Software, Inc. and Adabas from Software AG of North America. Focus can execute a relational join against the files from any two or more of these sources and send the results back to the DEC user.

Limits as to how much on-line processing should be done on the mainframe in response to a query can be incorporated into the user profile implemented on the mainframe side. For example, Cohen said, a query that was determined to require lengthy processing could be directed to run in a background or batch mode.

Although Focus on the VAX and mainframe look the same to the user, they are different products written to take advantage of each vendor's hardware. As a result, the VAX Focus user does not leave the VMS environment and work with the mainframe Focus once Focnet has established the link. Rather, data retrieval requests are passed from one site to the other and the response returned, Cohen said.

The initial product, set to be available in July or August at prices that range from $3,500 on the VAX side to $16,000 on the mainframe side, will allow queries only. A release to be issued later this year will allow updates to mainframe data bases from the VAX, Cohen said.

Focus is an information center-oriented fourth-generation language and data base management system installed on 2,200 mainframes and 400 VAXs, Information Builders spokesmen said. "A significant number of our DEC users are also IBM users," Cohen noted.

IRS clarifies 1706 law

Agency extends grace period for tax payments

BY DAVID A. LUDLUM
CW STAFF

WASHINGTON, D.C. — The Internal Revenue Service last week issued further guidelines aimed at clarifying Section 1706 of last year's Tax Reform Act and extended and broadened its grace period for late filing of some taxes due from employers as a result of Section 1706.

Considerable confusion has surrounded Section 1706 since its existence became widely known in November 1986. Part of the tax overhaul approved by Congress earlier in the year, it limits the ability of certain engineering and computer professionals to be treated for tax purposes as independent contractors, requiring many of them to be treated as employees of an organization for which they provide services or of a broker that places them in jobs.

The new IRS ruling makes use of 20 common law standards and three case studies to clarify when such technical service workers should be treated as employees of the broker. It emphasizes that the standards must be applied subjectively to individual cases to accurately assess a relationship.

The same standards might apply to questions about the relationship between a technical service worker and the organization for which he provides services, but the IRS is prohibited from issuing public statements on those relationships, IRS spokesman Wilson Fadely said.

The 20 standards chiefly concern an organization's right to control *how* an individual's work is done, regardless of whether or not the organization exercises that control. Such factors include whether the individual works for others and the length of the relationship.

The IRS also extended and broadened waivers on penalties applying to employers that fail to pay taxes or file tax forms required by Section 1706. The waiver now applies to late payment of Social Security taxes for the first and second quarters if they are paid by July 31, late payment of unemployment taxes for the first quarter if they are paid by July 31 and late filing of Form 941, Employer's Quarterly Federal Tax Return, for the first quarter if it is filed by July 31.

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NCR, Intel cancel plans to exhibit wares at NCC

BY ALAN J. RYAN
CW STAFF

The National Computer Conference, plagued by faltering preregistrations and a major reduction in exhibitors, was dealt another blow last week when NCR Corp. and Intel Corp. confirmed they will not display their wares at the show.

Dan Gerst, program manager for exhibit management at NCR, said the computer and business equipment manufacturer made its decision to drop out of NCC '87 after careful contemplation. Less than 150 exhibitors have purchased booth space for this year's show, which is set to run from June 15-18 at Chicago's McCormick Place. In previous years, NCC drew more than 700 exhibitors.

By not exhibiting at NCC, Gerst estimated NCR will save $30,000 to $35,000 in direct costs, including booth rental, travel charges and installation and dismantling costs.

Meanwhile, a spokeswoman for Intel said the semiconductor giant has reserved and paid for a 10- by 10-foot booth space for the show but has no plans to use it. She said Intel's booth was booked solely so the company would maintain its priority standing in case it choose to exhibit at NCC in future years.

A spokeswoman for the American Federation of Information Processing Societies (AFIPS) said late last week that she was unaware that NCR and Intel would not be exhibiting. The spokeswoman added that exhibitors who decide to pull out of the show are required to inform NCC of the decision.

Sharing the fair

In other developments, a spokesman for the show said late last week that NCC was about to sign documents to share NCC '87 conference space with Softfair, a job fair for software professionals sponsored by the Goldman Group, Inc. in Westford, Mass. "Softfair will be sharing the space and promotional costs," said Roger Halligan, promotion chairman for NCC. He added that some exhibitors will have booths in both Softfair and NCC.

Paul Vincent, president of the Goldman Group, said that Softfair and NCC will be "concurrent events, but not necessarily affiliated." He said that while there is no confirmed number of exhibitors for Softfair, "we would expect at least 40 exhibitors, but we won't know until we get right down to the wire."

Discussions on jointly running the Softfair and NCC shows began about three months ago, Vincent said. As of last week, NCC's Halligan said the group was very close to signing with a professional management team to run future NCC exhibitions.

The once-sprawling NCC, sponsored by AFIPS and four other groups, will be held in one hall at McCormick Place this year, although the entire exhibition center has been reserved for the show.

While the future of the show remains uncertain in the minds of vendors and users, some exhibitors who are committed to booth space have expressed optimism. A Fujitsu America Ltd. spokeswoman said her company's 60- by 60-foot booth will likely draw many visitors because some potential big-draw companies will not exhibit at NCC.

Scott Humphrey, a spokesman for Britton Lee, Inc. in Los Gatos, Calif., said his company plans to introduce a new product line at the show, and, he said, "because some of the big players have dropped out, it allows some of us not-quite-as-large companies to get a little more exposure."

Some larger vendors planning to exhibit at the show include AT&T, Honeywell Bull, Inc., Northern Telecom, Inc., Xerox Corp. and IBM. An IBM official would neither confirm nor deny that the company plans to make a new product introduction at the show. "It's our understanding that IBM is planning to make a new product announcement," NCC's Halligan said. He added that IBM has requested a separate room off the exhibit floor where it will likely have the product on display.

PS/2's pirate trap

Switch to smaller disk offers copying stopgap

BY DOUGLAS BARNEY
CW STAFF

The migration to IBM's Personal System/2 microcomputer line with 3½-in. floppy disks provides an ideal opportunity for MIS directors and micro managers to help eliminate pirated software, users said last week. However, it also may present the potential for further piracy as users make copies of already-pirated software to run on the new machines.

The issue of software piracy has died down during the past year, as most vendors removed copy protection and corporations implemented stringent policies against illegal copying. Nevertheless, most observers acknowledge that a large number of pirated programs are still in use, even in corporations that strictly police copying.

In helping end users convert software to the PS/2, managers may confront the issue of what to do about pirated software found in users' private software libraries. MIS or micro managers contacted by *Computerworld* said they will not assist end users in transferring pirated software to the new machines. Instead, the managers said, the transition to the PS/2 will be used to weed out the pirated software they expect to find. "Pirated software will just not be transported to the new system," said Fred M. Zickert, manager of personal computers for Eaton Corp. in Cleveland.

Alienating the user

This weeding out, however, promises to be a difficult process that may result in a host of unhappy end users. "You may end up alienating the end user," said a PC coordinator who asked not to be identified. And some managers themselves may be unwilling to police users. "You are asking people in the end-user computing departments to play God," a manager said.

One manager suggested that end users be appeased so they will not turn away from MIS or micro managers and "go it alone." He said illegally copied software that is useful to the user should be purchased legitimately by the company. Software that is not useful, however, should be thrown out.

But eliminating pirated software is not as easy as it sounds. In many cases, the discovery of pirated software is dependent on the user's neglecting to conceal the software from computer managers. "This process [of moving to a new format] will not detect pirated software" that users deliberately conceal from MIS, said Joseph T. Brophy, senior vice-president of data processing at The Travelers Corp.

Pirates will be pirates

The conversion itself could create occasions to pirate as users copy older software to 3½-in. disks and are tempted to give the original disk away, according to Brophy.

The extent to which pirated software is weeded out will also depend largely on the structure of the corporate computing environment. Centralized computing environments often have a good handle on the problem already, users said. But even centrally controlled organizations may be unable to eliminate all pirated software. If the software library is on a user's hard disk, an MIS professional may unwittingly transfer pirated software, one manager admitted. To avoid this, managers must go through the painstaking process of unearthing the original documentation of the software to verify its authenticity.

An alternative that managers are unwilling to discuss is to provide workers with mechanisms to move software libraries to the new diskettes and, essentially, ignore the possibility that they might transfer illegal, copied software. Nevertheless, this approach is expected to be taken in many decentralized organizations, users said.

Aaron Golberg, a microcomputer analyst and vice-president at International Data Corp. in Framingham, Mass., said he believes this approach will be common, because many workers have become dependent upon their pirated software. "Managers may have no choice if they don't want to impede worker productivity," Goldberg said.

Users say PS/2 bus lacks sparkle

BY ED SCANNELL
CW STAFF

While the technology used in IBM's Micro Channel architecture provides microcomputer users with some much-needed performance advantages, most observers agree there is little that is genuinely innovative in the IBM Personal System/2 bus.

Observers point out that the Micro Channel's multimaster bus, contention protocol, self-configuration abilities and use of burst-mode direct-memory access technology is a step forward in the context of microcomputers but that it is certainly not unique.

"Multimastering and self-configuration have existed on minicomputers and some mainframes for years. It's nice that IBM has finally put them on their microcomputers, but it's not something I would jump up and down about," says Neil Colvin, chief executive officer and chief scientist at Phoenix Technologies Ltd.

"There are some new ideas in [the Micro Channel], like the arbitration among the different boards in the bus and the contention protocol, but only in the context of the PC," says Dado Banatao, vice-president and general manager of Chips and Technologies, Inc.'s systems logic group.

This lack of sparkling technological innovation is, perhaps, one reason why so many prominent third-party manufacturers have not rushed to clone the system. Leading compatible makers such as Compaq Computer Corp. and Tandy Corp. have recently said all the Micro Channel's technological advances could have been accomplished within the existing standard.

Channel semantics

IBM's use of the word "channel" has led some to believe the Micro Channel is modeled after the multiplex channels used in IBM's large systems. Experts note, however, that the channel bears little resemblance to those used in IBM's larger systems, which connect processors with various peripherals.

IBM admits there is little technological relationship between the Micro Channel and its multiplex channels. The use of the word "channel" to describe the architecture is appropriate, however, according to Les McDermott, who supervised the Micro Channel project at IBM.

McDermott says a channel, by IBM's definition, is a mechanism used to transfer information to and from memory and I/O devices, which is exactly what the Micro Channel does. IBM considered the possibility of combining the Micro Channel's bus with that of its Personal Computer, according to the company, but there were several technological reasons why that would not be an effective implementation, such as serious degradations in performance.

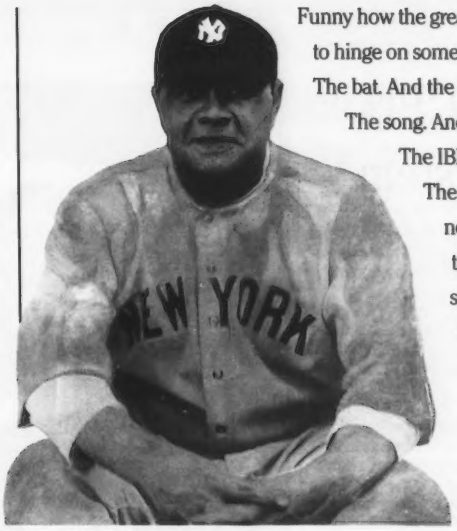
Third-party involvement

Many observers disagree, saying that in the next year or so there will be an extended period in which manufacturers will offer some combination of the Micro Channel with the existing bus.

IBM says it is has no plans to license the Micro Channel's design to third parties, although it says it will continue to license "utility patents" on a nondiscriminatory basis under reasonable terms and conditions.

Some observers expect IBM to eventually license the Micro Channel to third parties because it has published some of the channel's specifications and because IBM will need assistance if it is to establish the Micro Channel as a standard.

While there have been unconfirmed rumors that IBM has approached third parties about licensing the Micro Channel, many are surprised that IBM has not openly courted such vendors. Some suspect IBM has not because it does not own all the technology in the architecture.



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VMCENTER II FROM VM SOFTWARE, INC.

Altos 386-based CPU handles Xenix System V

BY DAVID BRIGHT
CW STAFF

SAN JOSE, Calif. — Altos Computer Systems tomorrow will reportedly announce a 64-user Intel Corp. 80386-based computer that it claims is the first 80386-based multiuser system to run Microsoft Corp.'s Xenix System V operating system.

The company said it has already shipped nearly 100 production systems, mainly to value-added resellers.

Because the new Series 2000 system uses the same chassis as Altos's 80286-based line, it is compatible with software developed for that line and benefits from the proven technology of those systems, said Jeff Bork, vice-president of product marketing and planning. The chassis uses a 32-bit bus and houses the company's Motorola, Inc. 68020-based OEM systems, Bork added.

"We're not bringing to market a product that's going to require six or eight months of shakeout," Bork said. "We want to stress the fact that it is shipping, that we weren't just trying to get an announcement out in time for Comdex/Spring '87. We now have orders for between 350 and 400 units, which will be our total production through the end of June."

Bork said software for the 80286-based systems can be recompiled to take advantage of the 80386 chip's extra capabilities. Rather than wait for Microsoft to finish developing Xenix System V, Altos did its own development to Microsoft's specifications, Bork said.

Altos is apparently the first well-known vendor to actually begin shipments of an 80386 multiuser system. Prime Computer, Inc. and Texas Instruments, Inc. both recently introduced competing systems but expect to start shipments in June and the fourth quarter, respectively.

While the Prime system has the ability of running Microsoft's MS-DOS as a task under Unix, the Altos system will not have that feature until late this year, Bork said.

Faster chip in future

The Altos and Prime systems use 16-MHz versions of the 80386, while the TI system is built around the 20-MHz version. Bork said that Altos will probably move to the faster chip in the future, when Intel is able to produce it in greater volume.

Prices for the Series 2000 start around $25,000 to $30,000 for configurations with an 80387 math coprocessor, at least 4M bytes of random-access memory (RAM), a small computer systems interface intelligent file processor subsystem, a communications processor, a 1.6M-byte floppy disk drive, a tape backup drive and one terminal.

The system can be expanded to up to 16M bytes of RAM and up to 1.2G bytes of hard-disk storage, Altos said.

Honored in New York last week *for "Achievement in Managing Information Technology" were, from left, Michael R. Zucchini, president of General Re Services Corp.; C. Clinton Joyce, senior vice-president of MIS for Albertson's, Inc.; Michael P. Cruskie, executive deputy commissioner of the state of New York Division of Criminal Justice Services; Joseph T. Brophy, senior vice-president of data processing at The Travelers Corp.; and, not pictured, Ron J. Ponder, senior vice-president of Information Systems Division at Federal Express Corp. The five were honored for outstanding contributions to their organizations through effective use of computer systems and communications technology. More than 350 nominations were received for the first annual awards, cosponsored by American Management Systems, Inc. and Carnegie-Mellon University's Graduate School of Industrial Administration.*

HP fills slot

FROM PAGE 1

puter operation.

The entry-level 9000 Model 825S outperforms DEC's Microvax II threefold and costs about the same, Hayes said.

The 825SRX, rated at 8.2 million instructions per second, couples the desktop 825S with a three-dimensional interactive graphics subsystem. Considered HP's fastest workstation, the machine is optimized for sophisticated mechanical engineering applications, according to Jim Haselmaier, product marketing manager for HP's Systems Software Operation.

The 825X and 850S, in contrast, bracket HP's existing 9000 Series 840S technical processor, which the company last week enhanced with the addition of an optional I/O extender cabinet. As a result of the enhancement, the 840S's main memory capacity has been quadrupled to 96M bytes.

The number of users it can support concurrently has tripled to 50, Hayes said.

A minimum 825S configuration, which starts at 8M bytes of main memory and holds up to 56M bytes, costs $42,500, compared with $200,000 for a basic 850S, which expands from 16M to 128M bytes of internal storage. In contrast, an 8M-byte base configuration of the 825SRX costs $86,500.

On the technical minicomputer side of its product line, the twin introductions of the 825S and 850S mark a sharp departure in HP's pricing strategy.

Last week's announcement also included HP's most specific and upbeat statement to date about its timetable for delivering the 3000 Model 930 and its progress in remedying the system's much-publicized ills.

HP recently said it will begin releasing the 930 in limited quantities in August. Prior to last week's update, the company had only said shipments would begin sometime between May and August.

Shipping in fourth quarter

HP also reaffirmed its previously announced intention to start shipping the 930's larger companion system, the 3000 Model 950, during the fourth quarter.

As part of last week's announcement, HP doubled the 930 and 950's maximum internal storage to 96M and 128M bytes, respectively, by upgrading their circuit technology to 1M-bit random-access memory chips. In addition, the firm has trimmed the former system's starting price from $225,000 to $180,000 — a response to IBM's 9370 announcement — and fixed the latter's previously undisclosed price at $260,000, according to Sharon Jacobs, marketing manager with HP's Commercial Systems Business Unit.

HP also added three storage products to its existing 3000 series processors, which use a conventional non-Spectrum design. Included among the peripherals are the Model 7980 tape drive and the Model 7937XP cached-disk module, the latter of which reportedly boosts the performance of the HP 3000 Model 70 by 20%. The third addition, known as Turbo Store, is software that allows disk-stored data to be backed up to as many as four tape subsystems simultaneously.

HP also furnished previously undisclosed details about the results of its ongoing efforts to resolve the software problems that necessitated a delay in the 930's shipments.

Announced alongside the 950 in February 1986, the 930 was originally set to be delivered by the end of last year. But in September 1986, HP reported some serious defects that forced it to postpone the processor's availability until "mid-1987." What prompted the sudden shift in plans were unforeseen inefficiencies in the 930's software rather than basic flaws in Precision Architecture itself, which uses a reduced instruction set as one of its main design elements, according to HP. In essence, the programs were found to contain far too many lines of code.

Since then, however, HP has edited or otherwise streamlined the software to reduce the amount of code needed to perform a given task. In so doing, the firm has increased from 60% to 73% the speed with which the 930 can read and open files or do other common I/O-oriented jobs, Jacobs said.

The 7980 tape subsystem costs $22,400, and Turbo Store ranges in price from $2,100 to $7,000, depending on the processor model. Prices for the 7937XP were unavailable at press time.

Contractors protest Defense MRP stance

Say cost-accounting regulations should be changed to take advantage of packaged software

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Defense contractors, responding to Department of Defense charges that their material requirements planning (MRP) systems may be overcharging the government, argued last week that military contracting regulations should be made compatible with MRP software.

At a congressional hearing, the Aerospace Industries Association (AIA) said there may be isolated cases of deliberate fraud, but the major problem is that MRP software first developed in the commercial world is basically incompatible with Defense Department cost-accounting regulations.

Therefore, the outdated regulations should be revised so that the industry and government will not lose the cost and efficiency benefits of MRP software, testified Don Fuqua, president of AIA.

He recommended formation of a joint industry/Defense Department task force to resolve the regulatory and software problems.

Suspects overcharging

The Pentagon has launched a sweeping investigation of MRP systems at 300 defense industry plants because it suspects that the software allows contractors to overcharge the government by shifting costs from one contract to another and inflating prices, in violation of procurement rules [CW, May 11].

An MRP system uses complex accounting software to regulate the flow of parts, inventories and costs at manufacturing facilities.

The system is used to prevent excess inventories and handle surges in production demand, for example.

Pentagon auditors want each part of the system and its actual cost pegged to a single defense contract to provide physical traceability, but many MRP systems reallocate parts to various commercial and defense projects to meet efficiency objectives on a daily basis.

Audit trail difficult

The Defense Contract Audit Agency (DCAA) is concerned that this constant reallocation makes it virtually impossible to generate an audit trail.

Furthermore, the auditors are concerned that when parts are transferred in inventory, they are given "moving average" prices that may be higher than actual costs.

According to the AIA, a policy of reserving parts for use on specific defense contracts "renders an MRP system virtually useless," because it prevents the software from juggling resources in the most cost-effective manner to keep the assembly line moving.

Furthermore, cost-averaging is an accepted accounting technique that "averages out in the end," AIA's Fuqua said.

The testimony was part of a series of hearings held by the House Armed Services Committee's Subcommittee on Readiness, chaired by Rep. Dan Daniel (D-Va.).

Williston B. Cofer Jr., a subcommittee staff member who summarized the MRP issue at the close of the hearing, said the contractors have taken software that was successful in the commercial sector and applied it to the government sector, but it cannot meet government regulatory constraints.

Change software, not rules

Rather than change the regulations, Cofer said, it is more logical for contractors to change their software to comply with government standards.

He noted that there are new MRP products that do meet Defense Department rules.

For example, Western Data Systems, an MRP software vendor based in Woodland Hills, Calif., claims that its product was specifically designed to comply with Defense Department rules for contract-by-contract accounting.

Other vendors of dedicated government MRP packages include Arthur Andersen & Co., McCormack & Dodge Corp., Management Science America, Inc. and Cullinet Software, Inc., according to International Data Corp., a Framingham, Mass.-based research organization.

"The AIA is taking the position that some of the regulations run counter to maximum efficiency in certain plant operations. But that doesn't really invalidate DCAA's concerns. DCAA is only concerned with the rules and regulations that are on the books," commented Rudy Konig, vice-president of government programs in the McLean, Va., office of Western Data Systems.

"You can't automatically take software designed for use in a purely commercial environment and just implement it in a defense environment. That just won't work, because in defense work each contract is a document unto itself, and you have to follow its requirements without reference to any other contract that you may be working on," Konig said in an interview.

NEC lengthens Multisynch monitor line

BY ALAN ALPER
CW STAFF

NEW YORK — NEC Home Electronics U.S.A., Inc. last week unveiled two high-end Multisynch color monitors targeted at sophisticated personal computer business and engineering graphics applications.

The monitors feature the same scanning ability as the original Multisynch display, which enables the unit to automatically adapt its vertical and horizontal frequency to the graphics adapter residing in the microcomputer. The feature facilitates compatibility with a wide range of graphics boards, including IBM's Enhanced Graphics Adapter (EGA) and Color Graphics Adapter (CGA), that are used in micros such as IBM Personal Computers, PC XTs and compatibles, Personal System/2s and Apple Computer, Inc. open-architecture Macintosh IIs.

The original Multisynch monitor, unveiled in November 1985, has captured a large portion of the color-monitor market and spawned a host of look-alikes. NEC said it is currently shipping about 50,000 units per month.

The Multisynch Plus is aimed primarily at business presentation graphics applications, according to Keith Schaefer, senior vice-president and general manager of NEC's computer products division. The monitor operates at 55 MHz and features a 15-in. diagonal screen with a resolution of 960 by 720 pixels. It carries a list price of $1,399.

A monitor for design

The Multisynch XL is intended for use in computer-aided engineering, design and manufacturing applications as well as desktop publishing, Schaefer said. It features a 20-in. diagonal display with a screen resolution of 1,024 by 768 pixels and operates at 65 MHz. The monitor can display up to 64 colors when using an EGA card and unlimited colors in Video Graphics Array, Multiple CGA and Professional Graphics Adapter analog modes. It lists for $3,195.

Both monitors come with a three-way text switch, allowing them to be used in a monochrome mode: paper-white for desktop publishing, green for monochrome graphics and amber for word processing or spreadsheet work.

The monitors feature flattened square-corner screens that are said to increase the viewing area and reduce glare, and full tilt-and-swivel capabilities. The two monitors are scheduled to be available this summer through NEC's reseller channel, according to the Wood Dale, Ill., firm.

Such robust sales have placed NEC in the enviable situation of not having to increase prices, despite yen appreciation of almost 70% since the monitor was introduced.

NEC unveils 386-based PC

BY DAVID BRIGHT
CW STAFF

BOXBORO, Mass. — NEC Information Systems, Inc. last week joined the swelling ranks of vendors with Intel Corp. 80386-based systems by introducing the Powermate 386 personal computer.

With prices starting at $5,095 for a configuration with 1M byte of random-access memory, one floppy disk drive and one 40M-byte hard disk drive, the system is competitively priced; a similarly configured Compaq Computer Corp. Deskpro 386 lists for $6,499.

The announcement comes two months after NEC revamped its APC IV line of IBM Personal Computer AT-compatible systems in an effort to become a more aggressive player in the PC arena.

NEC is targeting the new system for applications such as financial modeling, computer-aided design and manufacturing, desktop publishing and scientific modeling, the company said. Shipments are scheduled to begin in July.

The Powermate 386 includes a 16-MHz microprocessor and space for five 5¼-in. internal disk drives, which can be combinations of 1.2M-byte floppy disk drives or 40M-, 66M- or 130M-byte hard disk drives. A high-speed enhanced small-disk device interface, hard disk drive controller is optional. Memory can be expanded to 16M bytes, of which 10M bytes can be 32-bit memory, NEC said. The basic system includes eight full-size expansion slots.

NEC is offering three graphics boards for the system: an IBM Color Graphics Adapter-compatible board, an Enhanced Graphics Adapter (EGA)-compatible unit and the AGB Plus, a new board from NEC that includes compatibility with both IBM's EGA and Hercules Computer Technology, Inc.'s Hercules Graphics Card.

With the new line of systems, NEC is attempting to break into the ranks of the first-tier vendors, said NEC's director of marketing support Dick Miller.

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☐ REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION

Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, faster than previously thought possible.

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Dylakor buttresses its DB2, SQL/DS support

Interface from division of Sterling Software links data base to 4GL, report-writing systems

BY JAMES A. MARTIN
CW STAFF

WOODLAND HILLS, Calif. — Sterling Software, Inc.'s Dylakor Division announced last week further support of IBM's DB2 relational data base management system with a new interface for IBM's SQL/DS and an enhanced DB2 interface.

Dylakor's SQL/DS product reportedly links SQL/DS data bases with the company's fourth-generation language information management and report writing systems, Dyl-280 and Dyl-280 II. Using embedded SQL syntax, the interface acts as a front end, enabling Dyl-280 and 280 II users to access data within SQL/DS files. There are two versions of the Dyl-Interface SQL/DS system — one for IBM CMS environments and the other for IBM's VSE. Both versions are slated to be available in October and to be priced at $8,690.

Dyl-Interface reportedly enables users to combine two or more SQL/DS data base files. Utilities are said to include automatic copy, match, merge, sort, automatic translation of ASCII files and utilization of predefined Cobol data definitions.

"We expect this product to be functional immediately after installation for two reasons," said Dylakor President Carol Morton. "SQL is quickly becoming a standard, and many mainframe users are already familiar with Dyl-280 and Dyl-280 II's language."

Dylakor also announced Release 2.1 of Dyl-Interface DB2, a fourth-generation language data management system that retrieves and updates data information in DB2 files.

Enhancements are said to include the ability to retrieve a single row of data without the use of a cursor, the ability to create, alter and drop DB2 file definitions and access to DB2's Grant and Revoke security functions.

In addition, Dyl-Interface DB2 is said to join two or more DB2 files and to allow DB2 data to be integrated with data from other data base files, such as IBM's IMS or VSAM systems.

Dyl-Interface DB2 operates under MVS/TSO and any IBM mainframe supporting DB2, Dylakor said, and can be accessed in TSO or batch mode using either DB2's TSO Attach or Call Attach utilities. The new version is available now and costs $8,690. A retrieval-only version is priced at $6,380.

DYL-INTERFACE reportedly enables users to combine two or more SQL/DS data base files.

Other announcements made at Dylakor's first users group conference, held in Woodland Hills, included a VM/CMS version of Dyl-Calc, a mainframe spreadsheet software package. When introduced last year, Dyl-Calc operated under MVS or DOS/VSE operating systems only, requiring the use of CICS or TSO under MVS. Release 1.5 of Dyl-Calc will reportedly enter beta testing this fall and is set to be available by year's end for $6,000.

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3317-8721

Telecom seen enjoying power shift

BY DONNA RAIMONDI
CW STAFF

NEW ORLEANS — Telecommunications managers will wrest the control of information away from traditional data processing executives in the next decade, attendees at the International Communications Association 1987 Conference were told last week. But some attendees reacted skeptically to that assertion.

Communications applications will reach millions of end users in the next few years, fueled by the personal computer revolution, the growth of local-area networks and advances in data transmission speed and transport services, said keynote speaker Gideon Gartner, president and chief executive officer of the Gartner Group, Inc., a market analysis firm based in Stamford, Conn.

"There will be a power shift in favor of telecom over MIS," Gartner said. IBM has tried to bolster the power of MIS by giving it the tools necessary to manage and control networking, he added, but PCs have decelerated the trend of MIS control.

But inciting telecom managers to take power away from MIS is not realistic, attendee John Saccente, director of corporate telecommunications at Tenneco, Inc., said. "In the majority of companies, the organization is already in place, and if anyone takes control, it'll be MIS," he said. At Tenneco, telecom reports to MIS, which in turn reports to the financial management. The ideal is to have information systems, voice and data communications report to MIS, Saccente said.

Adversity not necessary

If managed correctly, the MIS and telecom control issues that many corporations are facing today do not have to be adversarial, said Alan Lusk, networking systems manager at Pepsico, Inc.'s Frito-Lay Division in Plano, Texas. In the past, the telecom people have been part of facilities management, while MIS has learned corporate politics and knows how to keep control. Telecom managers who want to get ahead should learn as much DP as possible, even if it means taking a career step backward to gain experience, Lusk said.

Getting management's attention is mandatory, agreed Michael Dortch, telecom analyst at The Yankee Group. "Telecom has to learn to play corporate politics."

Telecom managers should be talking to the CEO and the company's vice-presidents instead of hanging around in the basement, said T. Doane Perry, senior telecommunications analyst at Framingham, Mass.-based International Data Corp. There are turf battles going on among voice and data workers because voice workers are paranoid about not understanding data, and data people dismiss voice as simple, he said. But those battles take a lot of valuable energy to fight, and bringing the two sides together is not the answer, Perry added. Giving each group equal status, with both reporting to a chief information officer, would work better, he said.

PBX lines receive major additions

BY ELISABETH HORWITT
CW STAFF

NEW ORLEANS — Two leading private branch exchange (PBX) vendors presented major additions to their product lines during the International Communications Association (ICA) 1987 Conference held here last week.

Ericsson Information Systems unveiled a low-end model of its MD110 Intelligent Network line of digital PBXs. Priced between $550 and $650 per line, the MD110 Model 40 reportedly supports up to 460 lines and 60 trunks and can be upgraded to support additional ports as well as enhanced functions such as voice mail. The company said initial shipments will begin in September.

Ericsson also announced a series of enhancements to the MD110 line, including the following:

- The Terminal Adapter Unit for personal computers, an expansion board that provides IBM PC users with simultaneous voice and data connections through the MD110. Scheduled to be available in July, the product is priced at $450.
- The Terminal Adapter Unit-Digital Multiplexed Interface (TAU-D), which allows an MD110 to support asynchronous data links of up to 19.2K bit/sec. and synchronous links of up to 64K bit/sec. The product is compatible with AT&T's DMI host-to-PBX interface. Scheduled for shipment in December, TAU-D costs $550.
- The DS-1 Digital Trunk Interface, which provides connection to AT&T networking services such as Accunet T1.5 as well as DMI-compatible links between an MD110 and host computer. Slated for availability in September, the DS-1 is priced at $3,500.

Also at the ICA show, recently formed Fujitsu GTE Business Systems, Inc. unveiled its "large-system digital PBX flagship product," the Omni SIV, which is said to support up to 10,000 lines. Incorporating the Integrated Services Digital Network (ISDN) Basic Rate Interface for terminal connections, Omni SIV "represents the future direction of our company" toward ISDN, Fujitsu GTE President John Toomey noted.

Disoss-telex link next on MCI agenda

BY ELISABETH HORWITT
CW STAFF

As part of its current international marketing thrust, MCI Communications Corp. is expected next week to announce software that permits documents generated by IBM's Distributed Office Support Systems (Disoss) to be delivered to telex terminals worldwide.

Currently installed at two major MCI accounts, MCI's Gateway Manager software translates Disoss-generated documents from IBM's Document Content Architecture into formats that can be handled by either MCI Mail or MCI subsidiary MCI International, Inc.'s store-and-forward telex service, Safe, *Computerworld* has learned.

The software does not interface with other vendors' telex services, MCI said.

Position strengthens

By providing Disoss users with access to the approximately two million telex terminals worldwide, Gateway Manager strengthens MCI's position as a full-service provider to multinational U.S. customers, MCI International President Seth Blumenfeld said.

"The U.S. data communications market is $50 billion to $60 billion, while the international market is a little over $1 billion, but international access can be a real turning point in getting a multinational account," Blumenfeld emphasized.

AT&T only recently began providing high-speed data internationally. The company does not provide a telex link, Blumenfeld said.

Translates, stores, sends

A Gateway Directory recognizes and translates Disoss addresses that are on MCI Mail or Safe. Documents are transmitted from the Gateway host to a Safe node via a dedicated Systems Network Architecture link.

The Safe system stores telex messages and routes them to the right address when a line is free.

Other Gateway Manager features include assignment of multiple inbound telex numbers with answer-back to Disoss mailboxes and generation of VSAM and System Management Facility call records of all messages for network management inquiries.

The Gateway Manager runs on any IBM host running MVS, MVS/XA, VTAM, CICS and Disoss.

Available immediately, it will be priced at $15,000.

Last week, MCI announced that it would match AT&T's proposed 4.8% price reduction for interstate long-distance services in order to maintain its cost-advantage position over AT&T.

MCI's price reductions, like those of AT&T, pass along to customers savings that the carriers will realize from recent local-access charge reductions.

Banyan claims Vines/386 fully exploits chip

BY PATRICIA KEEFE
CW STAFF

WESTBORO, Mass. — Banyan Systems, Inc. will demonstrate what it claims is the first network operating system to take full advantage of Intel Corp.'s 80386 processor at Comdex/Spring '87 in Atlanta next week.

Intel 386-based software and hardware is expected to headline at Comdex, which is slated for June 1-4 (see story below).

Banyan is the second vendor to announce availability of a 386-based operating system. The Software Link, Inc. in Atlanta announced last week that it had shipped PC-MOS, the first 80386-based operating system for personal computers. The Software Link is said to be working with Novell, Inc. in Orem, Utah, to integrate PC-MOS with Novell's Advanced Netware network software.

A prototype of Banyan's Vines/386 network software will be shown running on Compaq Computer Corp.'s Deskpro 386.

Vines/386 is optimized to take advantage of the 386's 32-bit protected mode of operation and full adressing capabilities, Banyan said. Initial shipments are slated for the third quarter.

The latest version of Vines will be fully compatible with Vines/286 and Banyan's family of Motorola Corp. 68000-based network servers, the Banyan/BNS and Banyan/DTS. The company added that it plans to support, as network servers, IBM's 80386-based Personal System/2 Model 80 and 80286-based PS/2 Models 50 and 60.

Vines/386 software will offer complete access to network resources, including sharing of files, disks, printers, modems and network applications — that is, services like Banyan Mail and network management. Streetalk, Banyan's global data base for identifying, locating and controlling access to users, services and resources, will also be supported.

The new software will include protocol support for communicating with minicomputers and mainframes or with larger networks that include additional Banyan servers for connection to IBM mainframes. A Vines/386-based server will allow personal computers attached to the network to emulate 3270 terminals over IBM's Systems Network Architecture/Synchronous Data Link Control protocols.

Pricing will be available at Comdex/Spring.

Vendors chip away in Dixie

Comdex to feature second round of 386-based machines

BY DAVID BRIGHT
CW STAFF

The next wave of Intel Corp. 80386-based systems will hit Atlanta next week at the Comdex/Spring '87 microcomputer reseller show. However, 386 market leader Compaq Computer Corp. will not be among the exhibitors.

In addition to the many 80386-based products, the seventh annual show, which will run June 1-4, will also feature products relating to IBM's new Personal System/2 as well as add-in board vendor statements of direction concerning those systems, connectivity products and upgraded Intel 80286-based systems. Many attendees will also be taking their first look at the PS/2.

NEC Information Systems, Inc., NCR Corp. and Televideo Systems, Inc. are some of the more well-known vendors expected to highlight 386-based machines they introduced just prior to the show. Among the smaller vendors are names like American Computer & Peripheral, Inc., American Leading Systems, Inc. and Taiwan-based Mitac International Corp., which has developed a small-footprint system.

Compaq stays home

Despite the expected swarm of competing 386-based systems, Compaq has decided that "the return on our investment is just not worth it in our overall marketing plan," a spokeswoman said. Compaq was a prominent exhibitor at last year's show, but its decision is not indicative of any changes in the show's direction, said Dick Schwab, vice-president of project management for the show's sponsor, The Interface Group, Inc.

American Computer & Peripheral's desktop offering, configured with 1M byte of memory, a 40M-byte hard disk drive and an IBM Enhanced Graphics Adapter-compatible card, will start at $5,995. The company will also offer a tower version of the system.

Start-up American Leading Systems will be introducing its first product at the show. With one floppy disk drive, the Compaq-compatible 16MHz-system will start at about $3,500, a company spokesman said.

One of the first 20-MHz 386-based products to hit the market will be a motherboard from American Megatrends, Inc. Priced at $2,295, the board includes a zero-wait state processor, a socket for an Intel 80387 coprocessor and 1M byte of memory, expandable to 4M bytes. "We're claiming the greatest compatibility you can get," a spokeswoman said.

Officials at The Interface Group said they expect this year's event to be bigger than last year's attendance of 42,000 and that the show's health reflects the resurgence of the microcomputer industry after a two-year downturn. Preregistration is up about 60% from last year, according to Schwab. The show peaked in 1984, when it attracted 813 exhibitors and about 49,000 attendees. At press time, approximately 750 vendors had been signed up, compared with 600 a year earlier.

Some observers stress that Comdex/Spring is typically not so much a forum for new product announcements as it is a showcase for new products and a good environment in which to conduct business. "Atlanta has never been a big place for huge, whopping announcements. It's a place to do business," said Tom Roberts, an analyst with Framingham, Mass.-based International Data Corp.

386 not alone in product limelight

Panasonic 11 page/min laser printer, modems, PS/2 add-ons to vie for center stage

BY DAVID BRIGHT
CW STAFF

While systems based on Intel Corp.'s 80386 chip will be very much in evidence at Comdex/Spring '87, there will also be several noteworthy peripheral, connectivity and IBM Personal System/2-related product announcements at the show.

Likely to attract a lot of interest is Panasonic Industrial Co.'s 11 page/min laser printer, which is priced at $1,999 — apparently making it by far the fastest laser printer priced under $2,000. "We plan to offer a serious challenge to other laser printer manufacturers," stated national marketing manager Jim Cullen. Called the Laser Partner, the unit is built around a Panasonic engine that uses technology from the company's copying machines. Cullen said Panasonic may use the printer to enter the desktop publishing business.

The printer provides 512K bytes of random-access memory (RAM), 300- by 300-dot resolution, five built-in printer emulations, a serial and a parallel interface and two letter-size cassettes. Emulations include the Hewlett-Packard Co. Laserjet Plus, IBM Pro Printer and Epson America, Inc. FX-85.

NEC to add printer

NEC Information Systems, Inc. reportedly will introduce a 30 page/min laser printer starting at $10,995. The printer is intended for minicomputers and mainframes as well as personal computers. The series also includes lower end models.

On the systems side, Grid Systems Corp. plans to announce a 2.4K bit/sec. internal modem and a 20M-byte internal hard disk for its laptop computers. The modem is priced at $595, the hard disk drive at $1,175.

Datavue Corp. reportedly will try to generate more interest in its Datavue 25 portable computers by cutting prices on those systems for the duration of the show. The company plans to offer its $3,495 portable with a 20M-byte hard disk drive for $1,895. Datavue's Snap and Spark laptop computers are not slated to be included in the promotion.

Hayes Microcomputer Products, Inc. plans to celebrate its 10th anniversary by announcing a new communications product.

LAN revamp

Fox Research, Inc. is set to announce a new release of its 10-Net local-area network (LAN) that includes IBM Netbios support. Fox will also introduce a multipurpose repeater for linking 10-Net LANs that use a twisted-pair bus and AT&T Starlan topologies.

Asher Technologies, Inc. is scheduled to announce a $395 card that allows a personal computer to send fax transmissions directly from data files without the need for printing out hard copy first.

Novell, Inc. is planning to reveal a major upgrade to its Asynchronous Communications Server.

Preparing for operating system and utility software that turns personal computers into multiuser systems, Arnet Corp. is set to introduce the Virtual Terminal Adapter for speeding up the response of the terminals on such systems. To be priced in the $1,500 to $2,000 range, the board uses an Intel 80186 microprocessor and dual-ported RAM and is also intended to provide for multitasking on dumb terminals.

As add-on board vendors rush to build products compatible with the PS/2, Quadram Corp. intends to outline its plans for that area. Orchid Technology, Inc. plans to announce memory boards for the PS/2 Models 50 and 60 as well as a Jetram board that speeds memory access on systems using the company's Jet386 accelerator board.

Several PS/2-compatible monitors have already come on the market. Among the companies slated to introduce new VGA-compatible monitors at Comdex are Tatung Company of America, Inc. and Thomson Information Systems Corp. Tatung plans to display a 12-in. black-and-white and two 14-in. color monitors. Prices for the color units start at $689. The high-end color monitor provides a resolution of 800 by 560 pixels, according to the vendor.

Thomson's multiscanning Ultrascan monitor is said to automatically adjust to various horizontal- and vertical-scan frequencies. The two companies' monitors are also compatible with the IBM Personal Computer.

Targeting the emerging desktop publishing market, Cornerstone Technology should unveil a high-resolution 19-in. monochrome monitor for the IBM PC and Apple Computer, Inc. Macintosh II. The $2,395 unit sports a resolution of 1,600 by 1,280 pixels.

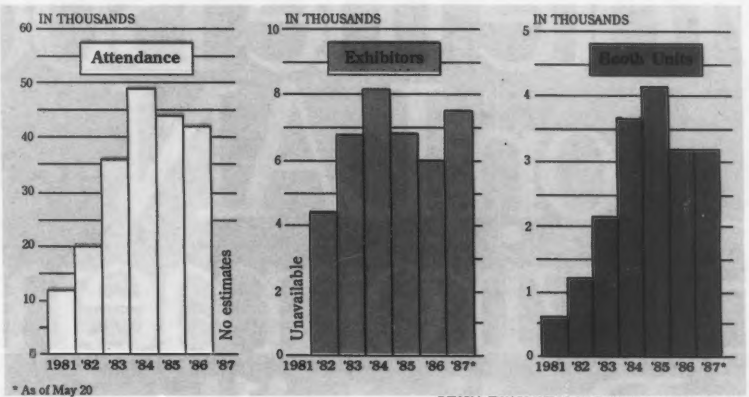
Imagen a publisher

Also for desktop publishing, Imagen Corp. is scheduled to formally announce its Document Description Language-based PC Publisher Kit. The board, which fits into an IBM PC, upgrades HP Laserjet printers by adding full-page graphics and extended font capabilities.

Apparently unslowed by its legal dispute with Lotus Development Corp., Mosaic Software, Inc. intends to introduce Revolver, a package designed to compete with Funk Software, Inc.'s extremely popular Sideways program. In addition to printing wide spreadsheets, the $69.95 Revolver reportedly allows the setting of directories and the customizing of fonts, among other features.

For speeding the creation of data base management applications under Borland International's Turbo Pascal comes the debut of Automated Software Concepts International, Inc.'s Turbo Ghostwriter. The $189 program is said to save up to 95% of a developer's coding time. Creator Tom Adams stressed that the program is for developers proficient in Pascal and is definitely not for the end user.

Comdex/Spring
Still thriving



* As of May 20

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CW CHART: MITCHELL J. HAYES

Novell Wrote the Book on LAN Environment Reliability.

No one knows local area network fault tolerance and environment protection better than Novell. We defined LAN fault tolerance. We pioneered LAN fault tolerance. And we've championed the cause of LAN fault tolerance for some time now. For one very good reason: because you can't afford to lose the data stored on your LAN.

Data Disaster Protection.

Without the fault protection provided by Novell's System Fault Tolerant (SFT™) NetWare and Transaction Tracking System (TTS™), your LAN is a data disaster waiting to happen. All it takes is a system glitch, hardware malfunction, disk error or (worse yet) a full-scale crash, and you could find

Compare Fault Tolerant Features.

No other LAN operating system software offers all the fault tolerant capabilities of SFT NetWare and TTS. Use this list of features to make your own comparison between SFT/TTS and any other LAN operating system.

	SFT NetWare Level II with TTS	Any other LAN operating system
Hardware-independent fault tolerance	•	
Duplicate directory structures	•	
Disk read-after-write verification	•	
Hot Fix™	•	
Disk mirroring	•	
Disk duplexing	•	
Transaction Tracking™	•	
Automatic rollback	•	
User-transparent data protection	•	
Multiple server support	•	

yourself painstakingly trying to rebuild your company's most important database. And paying for it with costly network down-time.

TTS and SFT NetWare's various levels of fault tolerance give you the flexibility to choose the degree of protection required by your company's LAN. And because you can install TTS and SFT NetWare on your existing LAN hardware, you can safeguard your LAN from data loss for a fraction of the cost of minicomputer fault tolerant systems.

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Give the data on your LAN the protection it deserves, with SFT NetWare and TTS. Write Novell for a list of applications compatible with SFT/TTS. Or visit an Authorized NetWare Reseller or call 1-800-LANKIND.

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Milestones Ahead.

Users bank on delayed Uccel financial software

BY ROSEMARY HAMILTON
CW STAFF

DALLAS — Uccel Corp. will announce a delivery date next month for its integrated loan package, an IBM mainframe-based banking application that was originally scheduled to be released this quarter. The company made the announcement last week at Infoweek, its user conference.

The statement is the latest effort by the vendor to appease users while it fine-tunes the long-awaited Infoloans package. Mindful of the problems that befell competitor Hogan Systems, Inc. when it released a malfunctioning loans package two years ago, Uccel has opted to proceed cautiously with its offering.

"We can't afford to be reckless with a product of this importance," said Uccel's Chairman Gregory Liemandt at the opening session of Infoweek, the Uccel Financial Systems Division users group meeting held here last week. "Until we feel very ready, we will not release it."

"This is our problem," added Donald Steele, general manager of the Financial Systems Division. "We didn't anticipate the amount of testing. We know it's causing some pain, and we appreciate you accepting that pain."

The company has 41 orders for Infoloans, the majority of which were placed in 1986, according to Steele.

While no new orders have been placed since the delay was announced, the company has not lost any accounts as a result, Steele said.

Timothy McCollum, vice-president of computer services and software at the brokerage house Dean Witter Reynolds, Inc., speculated that Infoloans will be out "in the fourth quarter, but a more reasonable expectation is first-quarter 1988."

A 1988 delivery date is acceptable to Michael Paolantonio, a vice-president at Multibank Financial Corp., a bank holding company in Dedham, Mass.

Paolantonio said he is comfortable with a one-year wait, but beyond that, "it really becomes critical as to how much more money you should be putting into your current system.

"I do have flexibility right now, but the longer [the delivery date] is moved out, the less flexible I become," he said.

"At first, it messed us up a bit, but the system seems so strong that we haven't considered going to another vendor," said Gary Nichols, vice-president of operations control at First Fidelity Bank NA in Pleasantville, N.J.

"We planned on it for 1987, so we had to reassess our plans," said a vice-president from a Pittsburgh financial institution who requested anonymity. "It is frustrating, and it would be very helpful if we had a date. But this approach — to give us a good product with no bugs — is a key point. We feel comfortable."

Yet another user said Uccel has soothed his company's concerns regarding its overall financial software purchase plans. The Morris County Savings Bank in Morristown, N.J., is evaluating Infoloans for purchase in two or three years. In the meantime, Uccel has committed itself to supporting its individual loans packages until 1990.

Flaws discovered in beta test

Uccel officials attribute the postponement of Infoloans to an unexpected and considerable amount of work the product needs, a fact that Uccel said was not realized until Infoloans went out to beta-test sites in December 1986.

The software is a highly complex product that came out of a three-year research and development effort formerly known within Uccel as the Leap project. Designed to run in an IBM MVS environment like Uccel's other financial software products, Infoloans would serve as a master system to manage and process all loan activity.

MDBS develops Guru for VAX

BY JEAN S. BOZMAN
CW STAFF

LAFAYETTE, Ind. — MDBS, Inc. is planning to release a version of its Guru expert system software for Digital Equipment Corp. VAX machines next month. The new versions, written for the VMS and Ultrix operating systems, reportedly took two years to develop.

Guru combines a built-in relational data base management system with spreadsheet- and forms-management software. It currently runs only on IBM Personal Computers.

Both the VMS and Ultrix versions of Guru should include Guru Version 1.1 features, which support full record- and file-locking capabilities. The VMS version will be available in June, MDBS said, while the Ultrix version will ship in July. Guru Tutor, a how-to manual for building expert systems, is included with the VAX Guru products, MDBS said.

Prices for the VAX versions will range from $17,000 to $60,000, depending on the size of the VAX configuration, MDBS said. Guru is priced at $6,500 for the IBM PC and DEC Vaxmate.

Joint videotex venture set for 1988 launch

Analysts skeptical, say IBM-Sears product no better than previous failed services

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Trintex, a partnership between IBM and Sears, Roebuck and Co. that is intended to prove that a U.S. videotex service need not be a failure, is preparing to launch its microcomputer-based service early next year.

At an information industry conference last week, a Trintex executive disclosed some general details about the service and predicted that it will boost sales of personal computers, including the IBM Personal System/2 family, by increasing their usefulness.

Harry E. Smith, vice-president of product and commercial development, said Trintex will provide a variety of information and transaction services for "time-starved" urban professionals, including personalized news summaries, airline reservations, shopping, financial transactions, messages and games. The videotex service will begin in several cities in early 1988 and become available nationwide by 1990, Smith said.

But analysts said they doubt that Trintex, about two years behind its original schedule, will be any more successful than previous failed videotex systems in the U.S., such as Knight-Ridder, Inc.'s Viewtron in Florida and The Times Mirror Co.'s Gateway service in California.

Not likely to turn a profit?

Bernell Wright, an analyst for Link Resources Corp. in New York, said he is skeptical about Trintex because it is not dramatically better than previous videotex experiments, which had high telecommunications costs and failed to attract consumer interest or long-term advertiser support. Wright said videotex is unlikely to be profitable until the divested Bell operating companies are allowed to enter the information services market. The telephone companies would not be dependent on advertising revenue because they could profit directly from the increased traffic on their local networks.

"It's difficult to imagine a sustainable, profit-making [videotex] business without the direct support and leverage of the public-switched telephone network, which the telephone companies have," Wright emphasized.

Trintex, based in White Plains, N.Y., was founded in 1984 by IBM, Sears and CBS, Inc., but CBS dropped out last fall due to budget cuts. Trintex is costing IBM an estimated $25 million a year.

Trintex's Smith said the forthcoming service requires a 1,200 bit/sec. modem, a monochrome or color monitor, a graphics card and a Trintex software diskette. The software helps to identify the user, automatically dials up the local Trintex office and translates the incoming data stream to the format used by the microcomputer, Smith explained.

To create a nonthreatening environment for novices, Trintex has developed a user interface with English commands that works for all of the information and transaction services, he added. Users will obtain the service via local telephone lines for a flat monthly fee, Smith said.

Firm upgrades desktop package

BY CLINTON WILDER
CW STAFF

MOUNTAIN VIEW, Calif. — Software Publishing Corp. today is scheduled to announce an enhanced version of Clickart Personal Publisher, its entry-level single-user desktop publishing program.

Called PFS:First Publisher, the product reportedly includes algorithms for improved dot matrix printer output and runs three times faster than Clickart Personal Publisher. The product will be available June 15 at the introductory price of $99, the firm said.

"First Publisher is aimed at the entry-level user who might have seen a high-end package like Aldus Corp.'s Pagemaker and knows what desktop publishing can do," said Linda Gill, PFS:First Publisher product manager. "It's for business people with word processing who want to make simple business documents look better."

PFS:First Publisher is said to allow users to integrate documents from word processing programs with professionally drawn graphic images and headline fonts and to create page layouts.

The product reportedly incorporates Software Publishing's enhancements to Clickart Personal Publisher, which the firm acquired from T/Maker Co. in July 1986.

PFS:First Publisher enhancements reportedly include much smoother edges on dot matrix image outputs, the ability to work with ASCII files up to 100 pages long and the ability to directly read files from Software Publishing's PFS:First Choice, PFS:Professional Write and PFS:Write.

EDITORIAL

Is it too late?

The sad tale of the National Computer Conference offers ample proof that too much success can be deadly. Although there are a handful of factors that contributed to NCC's demise, last week's report [CW, May 18] on the decline of the once-preeminent trade show clearly shows that the American Federation of Information Processing Societies and other show sponsors were riding an out-of-control train.

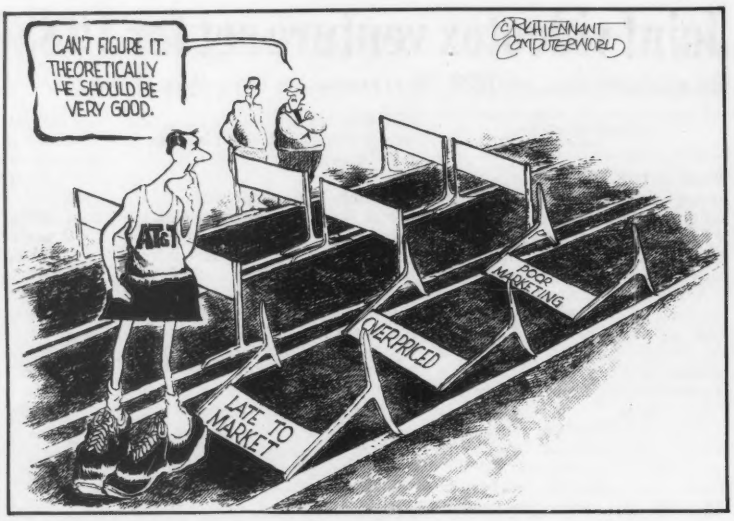
In retrospect, it seems that the mammoth number of exhibitors and MIS turnouts for NCC '82 and NCC '83, while undoubtedly lucrative for the sponsors, was in fact akin to the unbelievable growth rates briefly enjoyed by the early personal computer-clone vendors, many of whom rapidly tumbled into bankruptcy as the industry matured. With attendance approaching 100,000 and exhibitors numbering 700, attendees couldn't see all they wished.

The sponsors cannot be faulted for factors beyond their control: The explosion of the information industry; the ebb and flow of the economy; and the lure that NCC held for both vendors and users in the early 1980s resulted in the annual event becoming so large that it could be only be hosted in Las Vegas or Chicago.

But it is obvious that those sponsors lost touch with their constituents. Whether it was because of the show's size in 1982 and 1983 or the shift in location to Las Vegas in 1983, the user community voted with its feet, and it voted no. Even though more vendors were attracted to the desert setting, registered attendance in 1983 plunged to 65,000 from 97,000 the year before. Visitors didn't return to Chicago in 1984 — although registered attendance was ballyhooed as 85,000, NCC organizers now condede that 20,000 failed to show up. With attendance declining, vendors began to shun the event and thus began the downward spiral that some observers believe could result in this year's NCC being the last.

No focus! Too big! Those comments come through too often and too loud to be ignored. By welcoming exhibitors of such far-flung products as cleaning solutions and by failing to pay attention to the rise of the microcomputer, NCC's organizers became a hungry dinosaur unaware of the impending Ice Age. The problem was worsened by NCC's lack of professional management and its clunky reliance on regional groups of volunteers to pull the event together — encouraging volunteerism is admirable, but too many committees can be stifling.

NCC organizers claim to have learned from recent lessons. They claim to recognize the importance of microcomputers and are shopping for professional management for future shows. The question is whether there is any time left. This year's show promises to be the worst ever — just last week NCR Corp. decided to pull out. NCC, unfortunately, may be faced with another riddle: When a tree falls in a forest and there's nobody around to hear it, does it make any noise?



LETTERS TO THE EDITOR

Vaporware is such

The Special Report on IBM's new microcomputer line [CW, May 4] contains a major, persistent misstatement of fact.

An array of products with claimed delivery dates from one to two years from now are referred to in the present tense, as though they in fact existed. While the products may eventually do what is now claimed for them, they do not exist, and in some cases it is unclear whether their specifications yet exist.

Vaporware is vaporware, whatever your opinion of the issuing company, and you do the community a disservice by not sticking to the facts.

Neil Rest
Chicago

Pay notice to Apple

I am in hearty agreement with Paul Whittington, who questioned the unbalanced coverage given by *Computerworld* to reports of future multiuser extensions in IBM and Microsoft Corp.'s OS/2 and Apple Computer, Inc. Macintosh operating systems [CW, May 11].

In my opinion, this is just one example of a pattern of editorial coverage that consistently ignores or downplays the contributions made by Apple in today's microcomputer market.

I cannot help but be amused when I read learned discussions about desktop publishing in which the Macintosh is mentioned only peripherally — despite industry estimates that Apple has roughly 80% of the installed base of these systems — or articles on trends in networking that make no mention of Appletalk, when this low-cost, low-maintenance system outsells all other networking products in the retail computer channel.

With the SE and Macintosh II hardware and Appleshare and A/UX software, Apple is working hard to answer legitimate corporate concerns about connectivity and open architecture. And Apple's own operating system, with an installed base of more than one million users, can no longer be considered "quirky" or "obscure."

Gary R. Voth
Technical Writer/
Microsystems Programmer
Formula Consultants, Inc.
Anaheim, Calif.

This week in history

May 23, 1977
Recent suggestions by the federal Commission on Postal Service that the Postal Service should consider cutting Saturday delivery in order to cut costs have met with widespread congressional disapproval, while its suggestion that the post office consider providing electronic mail and an electronic message system has been virtually ignored, Capitol Hill observers say.

May 24, 1982
French statesman and author Jean-Jacques Servan-Schreiber warns that by 1990, 50 million people in the industrialized Western world will be jobless because of advancing high technology. "The savage forces of a scientific and technological revolution without precendent have not been tamed yet," he says.

Not historic yet

It is always good to see a long-standing controversy resolved as emphatically as it was by C. J. Date when he stated in "Debunking the myth of relational systems" [CW, March 30] that "The relational performance myth is finally debunked once and for all. It is a milestone in data base history."

Therefore, it is with some trepidation that I raise a few minor points about the debunking so soon after the historic milestone:

- After more than a decade of struggling with the IMS proponents within IBM, it must give Codd and Date Consulting Group a great deal of satisfaction to move up into the same performance league with IMS Fast Path. However, IMS has never been considered a high-performance system except when compared with relational systems. In fact, even IBM does not use IMS for implementation of internal systems that require very large data bases and where performance is critical.
- Perhaps more significant is the fact that the performance results cited are probably more indicative of the performance of Tandem Computers, Inc.'s operating system than they are of relational performance. Is Date really saying that a relational system can achieve Fast Path performance when both are operating under IBM's MVS/XA?
- While not wishing to question the objectivity of either the benchmark or Codd and Date, I would question whether the benchmark reflects the potential performance impact of "joining" large relational tables — a price that must be paid for the ease of use and flexibility that makes the

Continued on page 22

Future monitors: Display's the thing

CHARLES P. LECHT

The computer display provides the only real-time window to the inner workings of computer systems. As such, it is a very important device. Yet, despite all the improvements made in the technology in the past years, few have corrected the most basic defects found in our earliest displays — they are too small, hard on the eyes and expensive.

In many of today's portable and desktop systems, the supplied display is virtually unreadable. It seems their designers expected the screen would be read by one of those bank robots commonly used for reading the funny numbers at the bottom of a check. In all cases, the location of the viewer vis-a-vis the screen is critical to viewing anything, and a close proximity to the computer is generally required.

However, relief isn't far off. From what I've seen lately, I expect some display technology breakthroughs to take place.

The 37-in. screen

For example, at last month's Communications '87 trade show in Tokyo, I noticed a new display being used by exhibitors — one that has yet to make its debut in the U.S. but whose announcement is imminent. It is an intelligent red-green-blue (RGB) and VHSC display monitor with a 37-in. screen offered by Mitsubishi Electric Co.

"Intelligent" describes the monitor because it can adapt to accept the signal of almost any computer system commonly offered today, including personal computers, word processors and computer-aided design processors. Called the XC-3710/XC-3720, it is the first 37-in. display monitor.

Those of you who question the importance of this introduction have probably never tried to present computer-produced results on a standard 14-in. PC display monitor to a group of 10 executives. With heads bobbing to get a better view and the puff of one guy's cigar smoke blanking out the entire display, it can be a grueling experience.

With the Mitsubishi display, the group can see the results on a virtually flat screen the size of a two-page spread from *The Wall Street Journal* while sitting comfortably at a reasonable distance from it and one another. And the screen is much brighter than any standard phosphorescent tube being offered.

I have little doubt that many companies will follow Mitsubishi's lead and produce similar or possibly better displays. Future displays will feature ever thinner large-screen environments until, at last, they will be paper-thin and flexible.

The next real breakthrough will undoubtedly involve systems that offer the ability to project a computer system's output on a wide variety of receiving media and in broad daylight. This capability will eliminate our need to face a tube with the data inscribed from within.

When this happens, the window into our computer technology will have been relieved of its glass front once and for all. Following the solution to the projection problem, we can expect the three-dimensional variety to emerge. After we have suffered through a number of attempts involving the use of special eyeglasses, a breakthrough will occur freeing us of their need.

FUTURE displays will feature ever thinner large-screen environments until, at last, they will be paper-thin and flexible.

Large-screen 3-D computer-generated real-time projection will whet our appetites for holography, the be-all and end-all of computer wizardry. By this time, massive memories of a terabyte and picosecond processors will grace our desktops.

First enclosed in window spaces no larger than current displays offer, holographic pictures and data will appear as ghostly manifestations, hovering, confined and unmoving.

Later, these images will move while providing us with faithful reproductions of the reality we so fervently hope to recreate. And much later, the window space will grow so large that images will seem to burst from the box in which they were previously confined and surround us.

Then we will have entered the window to the world of computers to look from the inside out and see where we've been and rejoice in not being there anymore.

Lecht is chairman of Lecht Sciences, Inc./Japan, a Tokyo-based software think tank specializing in graphics. He is also an elected public member of the Hudson Institute and a free-lance writer on science topics.

Enhancing life after standards

Diversification prospers when products operate under a single umbrella

FREDERIC WITHINGTON

During the last decade, spreading standards seemed to be squeezing all computers into a few families of clones. But now it appears that a rich diversity of machines will develop under the standards umbrella. IBM's new Personal System/2 confirms the trend.

In the good old days before the IBM 360, new computers had a uniqueness. Whenever one was announced, the community would rush to look at it. Sure enough, there would be a new logic or storage component, a new word length or addressing scheme, maybe a new I/O buffering method.

But with the 360, IBM ushered in the age of compatibility. Recognizing (correctly) that users' software investments now precluded buying incompatible machines, manufacturers became reluctant to introduce architectural innovations.

In time, standard operating systems and communications architectures were added to the list of constraints on designers, and innovation slowed to a crawl.

Minicomputers brought a new freshness, but again, success led to ossification. At first, every one of Digital Equipment Corp.'s machines was different. But since the success of the PDP-11, DEC has brought forth only one major innovation — the VAX — and that's it for the foreseeable future.

Squelching innovation

So again with the personal computer. Each one announced in the late 1970s was different and innovative. Then the success of the IBM Personal Computer squelched innovation. Except for a few niches, other vendors were forced to offer IBM clones.

But a new freshness is raising its head — there's life after standards. We are beginning to see that diverse machines can interoperate under a single I/O, OS and network architecture.

This trend to diversity is most evident among scientific systems. Under Unix and Ethernet, users are not only interconnecting VAXs and 370s, they are also internetworking vector machines, parallel machines and autonomous workstations.

Vendors are responding as well: The very-long-instruction-word Trace computer and the Connection Machine are as novel as any computer has been for a long time.

The trend can be seen in PCs, too. IBM's PS/2 provides a Micro Channel with a standard interface for connecting modules that operate independently of the main system (coprocessors). More simultaneous memory accesses are supported than before, and IBM's OS/2 operating system supports overlapped operation of the modules.

PC coprocessors were already popularized in recent Macintoshes, the IBM RT Personal Computer and other machines. File servers, image processors and other specialized machines that form transparent network-connected extensions to PCs are also appearing.

TOM LEVITCH

Even the stodgy mainframe products are diversifying. Tandem Computers, Inc. showed that fault-tolerant transaction processors would be accepted by users for use as nodes in preexisting communications architectures. Specialized front-end processors are available, as are back-end file processors from such firms as Teradata Corp. and Britton Lee, Inc. IBM itself already plays the specialized attached processor game with the 3090's Vector Facility.

The trend to application packages fostered this product diversification. For instance, few users would have the specialized knowledge to program the graphics coprocessors they are buying for their PCs. Given bundled software packages, however, the market has taken off.

Future standards should accelerate the diversification. Higher levels of the International Standards Organization communications model and Integrated Services Digital Network will permit increasing diversity of transparent interconnection.

Most important of all may be IBM's recently announced Systems Application Architecture. Intended as a defensive standard architecture to foster porting of programs across IBM's four product lines, it may also permit porting across many more.

Future technology will also enhance diversification. Large gate arrays and application-specific integrated circuits make it easier to design unique logic. Huge memory chips make the storage of multiple operating systems tolerable. Array processors and optical storage foster image processing, and inference chips and list processing architectures foster artificial intelligence.

It is hard to think of anybody who is hurt by this trend, except maybe offshore suppliers of clones. Users benefit — they have the option of remaining all-conventional and being no worse off or using the novel products without compromising their overall standards environment.

Small companies started up to exploit a new product idea have the best chance in decades to be accepted by the market. The big companies benefit, too: They can selectively venture into the novel-processor business, or they can be content to benefit from the market expansion for conventional processors and peripherals that should be catalyzed by the innovative products.

Maybe best of all, the business is more fun for us techies.

A 30-year veteran of the computer industry, Withington was a vice-president of Arthur D. Little, Inc. and is now an independent consultant. He has written four books and more than 60 articles and papers.

Historic

CONTINUED FROM PAGE 20

relational model so attractive. Or, is Date telling us that the inherent performance penalty of "join" is a relational myth?

We have some things to thank Codd and Date for, but resolving the data base performance controversy "once and for all" is not one of them. Too bad — it is a real bore.

As long as we are on the subject of data bases, thanks to Charles B. Holleran of IBM, who wrote a letter that correctly pointed out there is a big difference between distributed data management and a distributed data base [CW, March 30].

We do not need any more simple solutions to complex problems.

Tim Tyler
Principal
S. S. Tyler & Associates
Mountain View, Calif.

Creativity contradiction

William Harrison's "Over the rainbow in a software garage shop" [CW, April 27] offered more wistful reverie of the creative good life than balanced insight into the problems of producing creative software solutions. His argument, based on the successful garage shops and coding skunk works, is not countered with a legion of unsuccessful examples.

The creative losses Harrison associates with structured controls is substantially overdrawn. The oppressive manager he identifies is an aberrant form, but, given the choice, that manager is in some ways preferable to the hackers insistently anchoring the other end of the scale. A multihacker garage will not get you one functioning system but a factorial form of solutions to a set of problems seeking definition. But Harrison was not talking about hackers. Neither have advocates of structured systems development been talking about totalitarian management. The substantial literature on these methodologies offers sufficient elaboration.

Yes, there is a creative symbiosis that arises from diverse and subtle personal and interpersonal factors one may be privileged to enjoy at rare intervals in one's life, if at all. Hardly anyone can actively create these circumstances, but almost anyone can destroy them. Harrison's views would have been more acceptable if he had offered this recognition with the other essential view that, symbiosis or not, the work typically must continue.

Harrison offers sound advice when he cautions that creativity not be stifled. When he suggests that creativity can be created by sound management practices, but yet somehow not managed, he contradicts himself and leaves the question as he found it.

Joe H. Jones
Professor
University of Arkansas
Fayetteville, Arkansas

Denormalizing data

William Inmon's Soft Line column, "Denormalize for efficiency" [CW, March 16], was excellent. However, I think the drawbacks to denormalization were underemphasized in two areas — one subjective and one technical.

The first is the case for normalization itself. One normalizes data for ease of query and maintenance. A slight increase in CPU time seems a small price to pay for a savings of man-months of effort in development and maintenance.

Second, denormalization has its own performance price to pay. Every violation of normalization negatively affects every process that changes the data values, such as hard-coded changes that need to be included in every process and therefore maintained.

In Inmon's example, adding supplies to the Part file would cause a considerable increase of I/O to answer the simple normalized question of which parts are supplied by ACE Hard.

Perhaps your experiences have been with relational data base management systems that do not perform efficiently with joins. If the relational DBMS is smart, however, unnecessary duplicate I/O's are eliminated; good buffering, clustering of indexes and proper index selection can provide efficient retrieval without increasing update processing I/O.

As Inmon mentioned, there are some extreme cases where data should be denormalized. However, each violation of normalization needs to be clearly justified, documented and publicized not only to the software development staff but also to the end users of the data in order to prevent interruptions or surprises during regular access procedures.

Paul Bass
Software Support Manager
Computer Representatives, Inc.
Santa Clara, Calif.

Clarification of DB2

Your coverage of our DB2 Data Dictionary was well balanced [CW, March 2]. However, I would like to point out, for the record, some incorrect information in the article.

First, our DB2 Data Dictionary referred to was never prototyped at New York State Employees Retirement System in any way, shape or form. We simply gained much of our DB2 knowledge there. Second, the application at New York contained in the area of 300 screens, not the workbench functions.

Barry Brown and Lewis Stone
Brownstone Solutions, Inc.
New York, N.Y.

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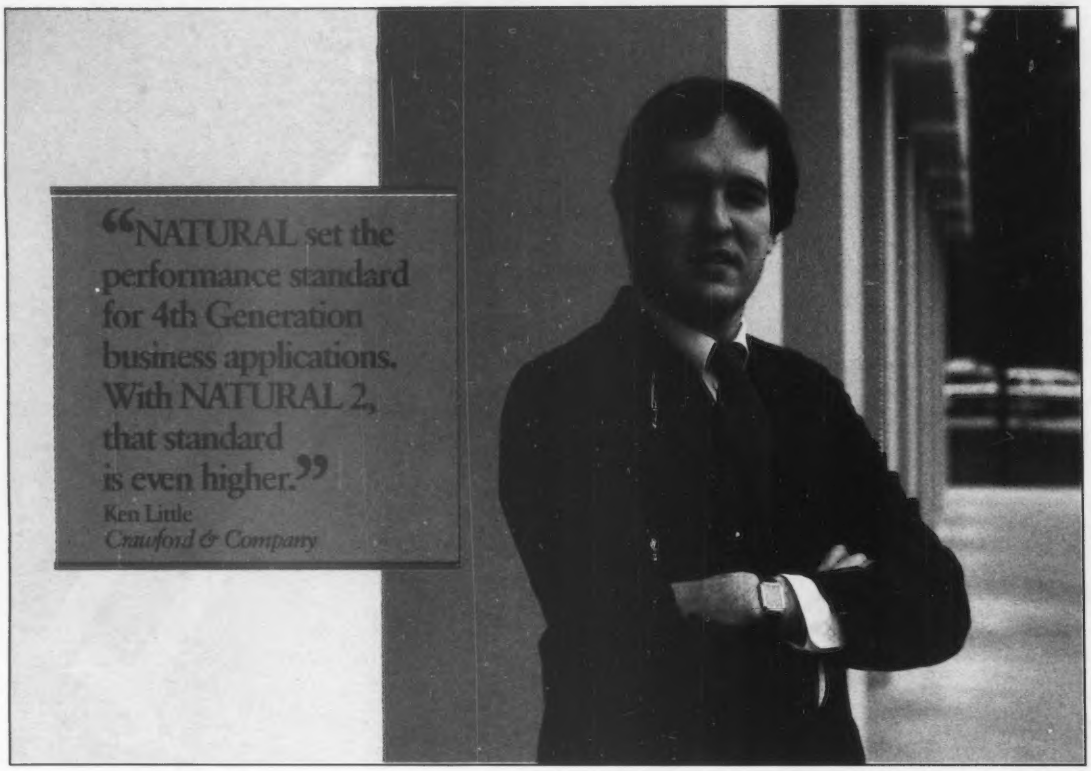

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PROGRAMMING BUSINESS SUCCESS

SOFT TALK

Steven Pfrenzinger

There's good news and bad

The combination of a relational data base management system and a multitasking personal computer operating environment will make distributed computing a reality, changing the face of computing and potentially revolutionizing the market position of many enterprises. For those who like change in their life, this is good news. The bad news is that neither of these developments will reach fruition before 1990.

Does this mean we have to put our data base plans on hold for three years? That's what some enterprises seem to have decided. More commonly, information systems departments are making no explicit decisions, relying on vendor guidance, most particularly that from IBM.

The organization and manipulation of data is, or should be, the keystone in any organization's information systems. Similarly, each organization and its information systems are, or should be, differentiated from those of competitors. Hence, each enterprise should have its own tailor-made (distributed) data base strategy. Such a strategy would do the following:

- Have concrete, tested plans for exploiting DBMS technology as it becomes fully available.
- Profitably use each piece of the new technology as it appears.
- Ensure that today's information systems technology is put to full use.

How many DBMSs are still being used as access methods? In fact, how many data bases are really files? How many PCs with Irma boards communicate more than once a week? This is not a test, since no one knows the answers. The point is that even today's technology often has only a fraction of its potential exploited.

As so often happens at the richest banquets, we are still working on one course when

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Expert system aids maintenance

Texaco's Progeval helps with modification of PL/I applications

BY CHARLES BABCOCK
CW STAFF

TORONTO — Texaco, Inc. has discovered it can automate some of its PL/I application maintenance tasks through the aid of an expert system, according to a Colorado State University associate professor.

The system, Progeval, was built based on analysis of a small fraction (about 50) of Texaco's PL/I applications selected for their capacity to provide examples of both good and bad programming, said Charles W. Butler, the Colorado State associate professor who helped design the system. Although it has not been put into broad-based use, Progeval continues to be developed and offers the potential of lending technical assistance to the maintenance of Texaco's PL/I programs, which make up half of the company's application library, Butler noted.

Butler, a soft-spoken academic who spends his summers working for Texaco, outlined the expert system to about 100 attendees at a recent Toronto gathering of the Software Maintenance Association. Rapid strides have been made in automating other areas of information systems, he said, but "software maintenance is still one of the most misunderstood concepts within the discipline."

Progeval was developed during a three-year period using a statistical base readily available to most mainframe shops, Butler said. The following subsystems collected data for what became the knowledge base of a backward-chaining expert system:

- An automated job-scheduling system for production applications, recording when and how often they were executed.
- The CPU usage charged back to the user per application.
- The computer operations manpower cost billed to the user.
- System complexity based on Thomas McCabe's metrics, which measure the number of GOTO and other nonvalidated constructs that tend to complicate a program.
- An automated manpower-scheduling system that contains proposed work on applications for the programming staff.
- An abnormal-ending tracking system that records staff response to system failure.
- Performance monitors that re-

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CCA data base reveals strategic add-on focus

BY CHARLES BABCOCK
CW STAFF

CAMBRIDGE, Mass. — When members of Computer Corp. of America's (CCA) users group convened in New Orleans last week, they were treated to a demonstration of the company's Model 204 on a specially installed IBM 9370.

The CCA data base management system running on IBM's low-end mainframe is a "load-and-go" version designed to run with VM/IS, the minimal operational-overhead version of the operating system.

CCA's Stewart

Moving its premier product quickly to the 9370 is part of an evolving strategy at CCA to offer the Model 204 as a strategic information system. Newly appointed CCA President Richard Stewart said he sees corporate executives using the Model 204 for information-retrieval purposes at sites that already have mainframe DBMSs. He said he is positioning the Model 204 as a DBMS used on top of the installed mainframe data base system, "targeting a strong share of the high end of the market."

"It's not that great in batch. It's much better on-line. It's much more flexible [than many DBMSs]," said CCA Vice-President of Marketing Jose Leruth, citing the Model 204's adaptability to departmental-level, executive information-retrieval pur-

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DEC offers publishing software

BY NINAMARY BUBA MAGINNIS
CW STAFF

MERRIMACK, N.H. — VAX Document, integrated publishing software designed to cut time and expense in producing complex technical documentation, is being offered by Digital Equipment Corp.

Developed for the company's VAX/VMS environment, VAX Document helps produce technical manuals, engineering specifications, project and business plans and technical articles, according to DEC spokesmen.

The software package can create text, use standard markup language, integrate text and graphics, control revisions and format documents, according to the vendor.

The software is said to operate with any DEC standard terminal and outputs to any DEC line or laser printer, including the Printserver 40 and Scriptprinter networked with Adobe Systems, Inc. Postscript laser printers.

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- DEC enhances corporate videotex with All-In-1 integration. Page 26.
- Kisco announces new version of System/36 disk-management package. Page 34.
- MacKinney Systems develops Passport for VM operating system. Page 35.

Survey: 'Quick and dirty' fixes may work best

BY CHARLES BABCOCK
CW STAFF

TORONTO — A De Paul University researcher who surveyed 112 Fortune 500 firms found that advanced software development methods with careful documentation cost an organization more in system maintenance time than traditional methods.

Sasa Dekleva, assistant professor of information systems at De Paul in Chicago, said the results of the survey were too imprecise to draw conclusions on why advanced development techniques lead to greater maintenance efforts.

Dekleva speculated, however, that one reason for the greater maintenance efforts was that maintenance programmers spend more time reading the documentation of an advanced system before attempting to modify or fix it.

Maintenance time related to user understanding

Advanced development approaches with documentation lead to more hours spent on maintenance

	Advanced approach — users understand system	*Traditional approach — users do not understand system*
Average maintenance hours per month	348	55
Annual change requests	25	31
Implemented changes	21	10

INFORMATION PROVIDED BY DE PAUL UNIVERSITY

In addition, users understand advanced systems better than spaghetti code and thus make more demands for system changes or additions, Dekleva surmised.

At the same time, he pointed out that some organizations may find it difficult to improve on the "quick and dirty" approach they have frequently used as the most efficient means of system maintenance.

Programmers who perform impromptu fixes without checking documentation may be just as effective as those who follow more structured approaches, Dekleva said.

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DEC rolls out VAX manager

BY NINAMARY BUBA MAGINNIS
CW STAFF

MAYNARD, Mass. — Digital Equipment Corp. recently introduced VAX Software Project Manager (SPM), a package for planning, estimating and managing medium to large software development projects.

With SPM, development teams can update projects interactively and report their status on the same VAX computer they use to develop software, according to DEC spokesmen. Software developers can enter project data such as tasks to be performed, resources needed and deadlines. The VAX SPM application analyzes the information and prioritizes tasks, the spokesmen said.

Using its estimating capability, the software package determines the project's cost and duration. SPM's project-control mechanism helps measure programmers' progress against the plan, breaking out comparisons for the overall project and individual contributors, spokesmen claimed.

The VAX SPM also includes estimation tools that calculate project costs on the Cost Constructive Model developed by Barry Boehm, author of *Software Engineering Economics*. The package identifies crucial tasks with the critical path method and uses standard Gantt, Pert and precedence reporting tools, DEC said.

The software package employs both menu-driven graphical and traditional command-line interfaces, the vendor said. A graphics terminal or Vaxstation is required for all graphical functions, and the command-line mode can operate from any class of terminal, DEC said. Novice users can reportedly learn the application quickly by using the graphical interaction, and experienced users can opt for command-line mode for both batch and interactive processes.

The application is licensed from $2,250 to $71,250, depending on the VAX configuration, and can be ordered for August delivery.

CCA data base

CONTINUED FROM PAGE 25

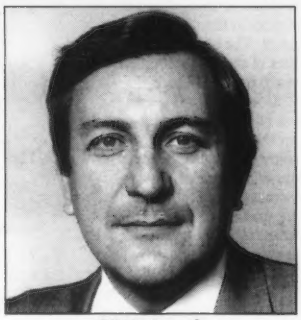
poses. CCA's Model 204, in simplistic terms, is "field-driven," Leruth said.

When major oil companies increased the price of a gallon of gasoline to more than $1, the price change resulted in a simple addition to the price field in the Model 204, while other DBMS users had to redesign that data element, Leruth said.

The DBMS also offers features frequently not found elsewhere. It can use variable-length records, allowing data base designers to store text as well as alphanumeric data of preset length. The fourth-generation user language and I/O controls are embedded in the DBMS's nucleus, freeing them from being called by the operating system.

It is not surprising that the new management of CCA, installed by parent Crowntek, Inc., has outlined a niche for the Model 204, since it has always been a niche player. The original Model 204 was designed for use by the Central Intelligence Agency; other defense agencies adopted it, and, consequently, the Model 204 often has been referred to as a federal government DBMS.

CCA officials said their DBMS has outgrown that reputation and that 75% of its users are now commercial customers.



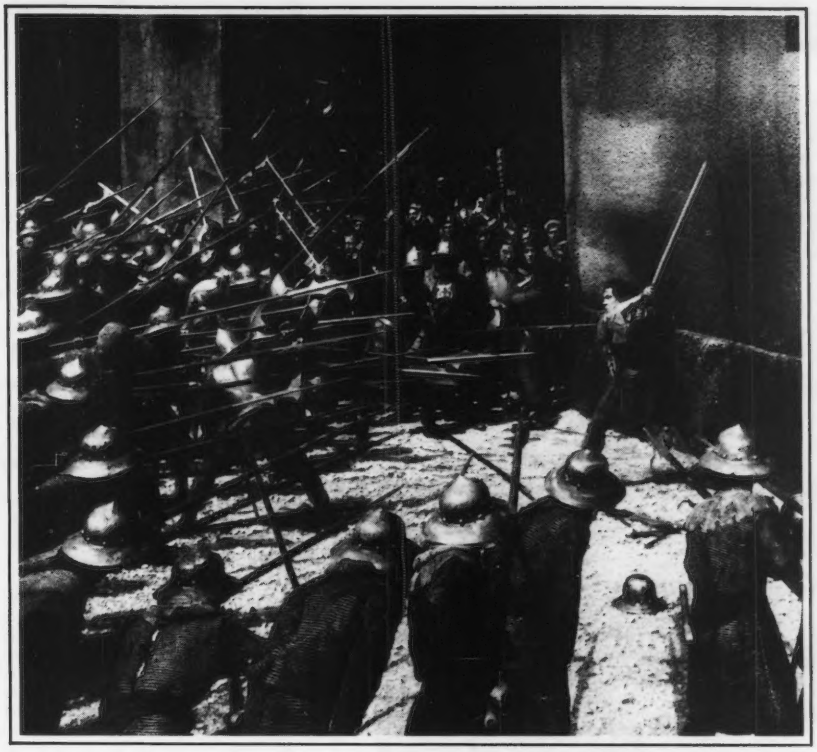
CCA's Leruth

CCA President Stewart said he anticipates IBM will sell 9370s at a brisk rate and that with the Model 204 semi-independent from the operating system, the DBMS will be able to support 20 to 25 users on the hardware in a high-performance environment. Stewart claimed the Model 204 running on a 9370 would be able to support as many as 150 transactions per second. The firm is going to conduct a standard Tandem Computers, Inc. ET1 benchmark of the Model 204 on the 9370 to test that claim, he added.

The 9370-geared release of the Model 204, Version 10.0, is set to be generally available in the first quarter of next year.

CCA said it is committed to deliver an SQL interface to the Model 204 within the next 12 months. The SQL queries would be translated into User language queries by the interface for accessing the data in the Model 204, company officials said. The Model 204 can provide external data views in the same manner as a relational DBMS, but CCA officials said the User language provides the most efficient means of accessing data.

In addition, CCA, a pioneer in the field of distributed data bases, anticipates a distributed version of the Model 204 with recovery capability within two years, Leruth said.



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'Quick and dirty'

CONTINUED FROM PAGE 25

The tentative conclusion drew some exclamations of surprise from attendees at the meeting of the Software Maintenance Association, which was held here recently.

For several years, experts have debated the best approach to software maintenance, usually concluding that more sophisticated development approaches — such as structured software engineering, data base-oriented information engineering and prototyping — would yield maintenance dividends. Dekleva's survey yielded few results that supported that conclusion.

In comparing the time spent maintaining systems, Dekleva found "no significant difference" in time spent on software developed using advanced approaches vs. traditional approaches. "This was certainly unexpected," he told association members.

Time spent on recovery-type maintenance activities was lower with advanced systems, but other maintenance activity was higher.

Understand advanced methods

Users tend to better understand systems developed with advanced methods, such as prototyping, and therefore make change requests that are more likely to be implemented, according to Dekleva's figures.

Twenty-one of 25 requests were implemented with systems understood by the users in the survey, compared with 10 of 31 requests by users who did not understand their systems.

At the same time, maintenance time was higher on the systems that had achieved a degree of user understanding; 348 hours per month vs. 55 hours per month.

The survey did not attempt to define how dependent the organizations were on the advanced vs. traditional systems or the complexity of their current role, Dekleva said.

Dekleva noted that "keeping the documentation up to date takes additional time, while a quick and dirty fix may be that much faster."

Expert system

CONTINUED FROM PAGE 25

cord hardware usage during system execution.

The data collected by these subsystems became the source of information Progeval evaluated and reduced to 17 variables. The variables included vital statistics such as number of emergency fixes, number of requested changes, amount of CPU and TSO teleprocessing monitor usage required and perceived difficulty of maintaining the system.

Butler credited James Elshoff of General Motors Corp. for providing another source of vital statistics, through GM's Peek program, which scans PL/I programs and provides a complexity reading on them.

"Program complexity correlated extraordinarily highly to system failure," Butler recounted.

LISP-to-mainframe woes

Another unsurprising correlation was found between an application's manpower needs and the number of emergency fixes it required, he said. As Butler began developing rules for the expert system, he said he found it difficult to tie the mainframe data collected to the knowledge base. "All of the information was nice, but we couldn't implement it," he explained. "We were unable to link a LISP machine to a mainframe and get the data."

A Texaco staff member built an expert system shell, Texpert, that ran on a mainframe to get around this roadblock. The prototype of Progeval was built with Texpert, using an IBM ISPF-type user interface with heirarchical menus, data entry screens and information messages. In addition, a batch component of the system gathered data from the subsystems and loaded it into ISPF tables.

The batch procedures were key to the operation of the system, Butler said. "Assimilation of expertise — both facts and relationships among facts — is a costly, exhaustive task," he said. The subsystems automated the collection of data, and Progeval's batch process provided an automatic means of evaluating it.

With that background support, a user can consult Progeval, examining particular applications. It is still left up to the user to assign a level of confidence required to the application he is examining. The expert system then applies the rules of how well it should be written and perform vs. the knowledge of how well it has run in the past.

The system can highlight trouble areas, prescribe corrective measures and even offer a rough judgment on when an application's problems and costs are outstripping its ability to perform, leading to a recommendation that it be rewritten.

Butler said one of the main advantages of the expert system is simply its ability to avoid the bias of the maintenance staff. "Often, verbal feedback on an application was disproven by the numbers. . . . Systems managers get attached to their code" and do not see how much they are investing in maintenance, he added.

Another source of misleading feedback came from new managers attempting to enlarge their domains with additional programmers by discovering problems invisible to their predecessors.

"We attempted to move that evaluation away from the staff. We wanted to remove that subjectivity," Butler noted.

Using the wrong 4GL to write a production system has its risks.

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Good news . . .

CONTINUED FROM PAGE 25

the next one is served. In this case, DB2 is the next course; IMS and other established DBMSs are not being acquired at their former rate. In some quarters, they appear passe — in spite of the fact that this is well-understood software with individual firms having invested hundreds or thousands of staff-years to develop applications and master the technology.

The odd part is that DB2 and its ilk may be stars, but talk to those who have had DB2 for a while and you find that actual use is still largely experimental. Not that this is wrong; IBM was correctly cautious in initially pushing DB2 as a high-class report writer. This got people into things, but not over their heads.

But a dangerous vacuum may be forming as we wait for the magic tools — after all, relational technology is only a tool. Other, older tools can often do new tricks if there is sufficient skill, prompted by a large-enough need. I have experience here, having been part of a team that designed and implemented crude but effective artificial intelligence applications built on IMS, PL/I and Cobol.

So the first step is to carefully examine the here and now to see if it is good enough to give a business a three-year head start on the competition, who may be sitting things out, waiting for the "right" tools.

Of course, older technology isn't right for everything, otherwise we would still be using machine language. Let's take DB2 as the best-known example of a new software technology being delivered incrementally; incremental in the sense that DB2 is partway along in the following areas:

- Being fully relational (if you accept Edgar F. Codd's "grading" system).
- Development and support tools (an active data dictionary still to come).
- Our understanding of how it can be used.

This last point is the least discussed but may be the most important. DB2 was first presented as a sort of front end to IMS; now it is presented, and largely accepted, as a full-fledged production DBMS already suitable for applications.

But which applications?

Order-entry applications are on most people's lists because of application characteristics such as dynamic data; well-understood application functions; being a somewhat self-contained application area; and the need for many ad hoc reports for sales and marketing.

But how many critical and unique business problems are there when people say, "Finally, DB2. Now we can get down to work." Technology and tools, even in an intermediate form, may be getting ahead of us again.

The same thing might be said, albeit more strongly, concerning a new operating system for the Intel Corp. 80386 chip. This operating system will have multitasking for the PC, almost certainly possess well-developed hooks into LU6.2 for host connections and, perhaps, some kind of host data base interface.

But if the world were full of well-defined business needs that simply had to have a next-generation micro operating system, then Digital Research, Inc.'s Concurrent DOS, available for several years, would have swept the board. The problem is that few PC users understand multitasking to mean much more than not having to wait so long for something to happen on the screen. And few information systems departments have been able to use PCs as more than terminal replacements; many still see PCs as primarily an irritant.

So people try DB2 and begin to use it; some, I'm afraid, only to keep up with the Computer Joneses. There is a problem and a temptation in such incremental use. Since DB2, for example, is a moving target, the tendency is to wait and see before using it seriously. This tendency is aided and abetted by many of the data base technical folk, who are as much interested in learning as doing.

Planning

In a way, we're lucky that relational DBMS technology and the next generation of PC operating systems are not with us yet. In a sense, we have been given a grace period to prepare ourselves for the next wave. The unfortunate thing is that so few enterprises seem to be getting ready to take advantage of the new technology when it does arrive.

There is little question that planning should be going forward. The potential gains are significant, including having much better access to information, more flexible systems and the opportunity to bind enterprises together using information and technology.

This sounds good, maybe too good. Why not sit tight and let someone else pioneer? But most firms can't passively wait. The problem is that the following risks to using the new technology are at least as big as the benefits:

- Much higher costs, if not handled correctly.
- Potentially enormous problems with security and control.
- Many opportunities to build utterly inadequate systems.

The problem is that while a fair number of people have conceptual ideas on how distributed data bases might be used, hardly anyone knows how well they might work. No wonder IBM has been putting our feet into this particular tool so gradually.

The first step for every information systems organization is to keep informed

Continued on page 32

With some 4GLs, training users can be a real challenge.

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Good news . . .

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about the technology, although even this will not be as easy as it looks. If it were not for IBM's relative openness on these topics, there would be precious little readily available.

But keeping informed goes beyond peering into the technology window. Information systems departments must examine what type of information-based initiatives others in their industry are attempting. This means keeping track of industry movements in an organized, analytical way; current efforts in this area tend to be episodic and anecdotal, when they exist at all.

Then the hard part begins. How should the enterprises respond? What initiatives of its own are possible? Information systems executives may then find themselves in the unfamiliar, but congenial, role of working with, for example, the marketing department to answer these kinds of questions.

Experiments in the technology should be started, continued and accelerated. It's not just that hands-on experience is the most valuable asset, but that each organization will have to satisfy its own combination of business needs in a particular technical environment.

As experimentation continues, information systems management can begin to turn a critical eye to current applications. What are their defects — both in a technical sense as well as from the standpoint of meeting business needs? How much would the use of new technology improve matters? Is it feasible to modify old systems or is a fresh start necessary?

After information systems has started to become comfortable with what the new technology actually means to them, information systems management can approach customer departments more confidently and with heightened concreteness. This cautious approach is especially important for information systems departments who have had credibility problems with key users.

I have found in my work that user departments are often on one extreme or the other. Believing either everything, or nothing, is possible when using technology. Shaking users out of their preconceived positions is one of the hardest parts of getting information systems and other business units to plan together. A few years ago, many of us thought that the widespread use of PCs would make it easier to talk to non-information systems business units. In many cases, however, PCs have just introduced another layer of preconceptions, such as "Why does it take you six weeks to do what it takes me two days on my PC?"

Although relatively straightforward, this analysis may seem hard to put into practice in these days of mergers, overhead reduction and short-term goals. Fortunately, the quality of the planning effort is probably more important than quantity. There may not even be a need for full-time people being assigned to it; in fact, there are good arguments against cutting people off from the rest of the organization. A larger problem will be to find the people who have an aptitude for dealing with technology and business.

Pfrenzinger is president of IMS Consulting, Inc., an Encino, Calif.-based firm specializing in IBM's IMS DB/DC and CICS/DL/1.

DEC software

CONTINUED FROM PAGE 25

VAX Document integrates with VMS software development tools so that programmers can create documentation with the same tools they use to develop software, DEC said.

A programmer, for example, can use the VMS Language Sensitive Editor to create text, DEC's Code Management System to maintain documentation files and VAX Document to format information, the vendor said.

DEC claimed the VAX Document markup language allows users to focus on content rather than formatting.

Using any VMS editor, users reportedly can create files, enter text and insert markup instructions that identify each text element, such as subhead, list or paragraph of body copy.

Functional features

The software package automatically formats documents according to markup instructions and provides full hyphenation, justification, pagination, placement of headers, footers and footnotes and page numbering, the vendor said.

DEC's Decnet networking software allows central work groups to create documents using contributions from departments across an organization. Formatted text can be interchanged among all VAX Document-based systems.

A large, multiauthored project in which several writers work on different chapters of a single book can use VAX Document's bookbuilding facility to merge chapters, automatically number sections, create a table of contents, verify cross-references and create an index, DEC noted.

The software merges any Postscript-compatible graphics files and graphics produced with Decgraph or Decslide into text files being formatted for laser printer output, the vendor said. Documentation groups can then eliminate manual paste-up.

The package is priced from $1,350 on the Vaxstation 2000 to $32,400 on the VAX 8800.

DEC said the software package is scheduled to ship in 60 days.

NEW PRODUCTS

Systems software

BBN Software Products Corp. has announced **Dataprobe,** an interactive time-series analysis and graphics system.

Dataprobe is said to provide users with direct shareable access to gigabytes of source data. It contains its own structured command language that allows users to create automated procedures for producing routine quick-look reports. The system can be used to analyze recorded data from sources such as telemetry and recording systems; wind tunnel tests; computer simulations; atmospheric testing and biological and physiological recordings.

The Dataprobe system runs on Digital Equipment Corp.'s VAX computers under the VMS operating system. Prices range from $30,000 to $65,000.

BBN Software, 10 Fawcett St., Cambridge, Mass. 02238.

Manufacturing Decision Support Systems, Inc. (MDSS) has enhanced its **MDSS** manufacturing planning software to allow organizations to run multiple companies from a single copy of the software.

According to the vendor, each division or company can configure MDSS to its specific needs while using the same source code. Each entity can be locked out of the other's data, but data can also be available to all divisions.

The software has also been enhanced to include a training data base which can be used during installation of the software and for testing operating procedures and new modules. MDSS costs from $36,400 to $84,000 It runs on Hewlett-Packard Co. 3000 systems.

MDSS, 300 E. Ohio Building, 1717 E. 9th St., Cleveland, Ohio 44114.

Westmoreland Software International, Inc. has released **Version 7.1** of its **Application Design and Development** (Add) system for the IBM System/34 and 36.

The Add System is said to generate RPG source code and documentation for reports, on-line inquiries, file maintenance programs, batch programs and bar graphs. Version 7.1 includes a report writer language for nonprogrammers, the ability to preserve modification to RPG source code, access to screen attributes for fields, the ability to enter compile-time arrays, the ability to copy programs from one CPU to another, the ability to handle alternative index files with incontiguous keys and enhanced manuals.

The Add System is priced at $3,850.

Westmoreland Software International, Suite 195, 853 E. Semoran Blvd., Casselberry, Fla. 32707.

Signal Technology, Inc. has announced **Version 6.0** of its **Interactive Laboratory System** (ILS) for the Digital Equipment Corp. Microvax, Vaxstation 2000 and local-area Vaxcluster products.

ILS was designed for scientific and engineering applications that require analysis of time-series data using digital signal processing techniques. ILS operations include frequency analysis, digital filtering, numerical analysis, data manipulation and speech processing. It supports data acquisition functions for the Vaxlab real-time Scientific Workstation. Version 6.0 provides windowing features and includes a simplified menu system.

Prices range from $5,100 to $12,500.

Signal Technology, 5951 Encina Road, Goleta, Calif. 93117.

Applications packages

Biodesign, Inc. has introduced **Biograf/GKS**, a molecular-modeling software package said to run on Digital Equipment Corp.'s VAX computers.

Biograf/GKS is a computer-aided molecular design package. It features the ability to simulate both small and large-scale molecules and the ability to integrate molecular mechanics with computer graphics, allowing users to analyze problems interactively rather than remotely.

Other features include molecule-fragment libraries for building larger molecules and force fields such as MM2, Amber and Charmm, which are recognized mathematical formulations used to express the forces between atoms.

Biograf/GKS is priced from $34,950 to $95,000.

Biodesign, Suite 615, 199 S. Los Robles Ave., Pasadena, Calif. 91101.

Cadam, Inc. has announced **Professional Cadam Release 1.2.**

Professional Cadam is a computer-augmented design system that operates on a stand-alone general purpose computer workstation. It utilizes an IBM 5081 display and a 5085 controller, but also supports a native display hardware configuration that does not require the 5085 controller.

Release 1.2 offers drawing functions including hatch and fill of dittos and symbols, support for the IBM floating-point card and the RT processors, an interface to Interleaf, Inc.'s RT Publishing Software System and plotting support for both pen and electrostatic plotters.

Professional Cadam is priced at $10,000.

Cadam, 1935 N. Buena Vista St., Burbank, Calif. 91504.

Languages

Interactive Software Engineering, Inc. has announced the **Eiffel** compiler and programming environment.

Eiffel is a language and set of tools said to use an object-oriented programming methodology. The language offers classes with multiple inheritance, generic parameters in the Ada style and information hiding for the construction of large systems.

It reportedly includes an original mechanism for expressing assertions and invariants and is statically typed for added security.

Eiffel is available on all versions of AT&T's Unix operating system. Pricing starts at $1,995.

Interactive Software Engineering, Suite 7, 270 Storke Road, Goleta, Calif. 93117.

Utilities

Kisco Information Systems has introduced **F1 Manager Level 2**, an enhanced version of its IBM System/36 disk-management package.

Level 2 of the software includes a disk-backup facility said to be a functional replacement for SSP Computer Services, Inc.'s Save All. It allows users to create master backups with true incremental backups between masters. Level 2 also features the ability to back up files, libraries and folders in groups.

F1 Manager Level 2 costs $250. Registered users will receive the upgrade free.

Kisco Information Systems, Suite 5-G, 120 Beverly St., Mt. Kisco, N.Y. 10549.

Microtec Research, Inc. has announced **Xray68K**, an integrated high-level/assembly-level debugger for the Motorola, Inc. 68000 series of microprocessors.

The Xray68K is said to be capable of debugging programs created by Microtec's 68000/10/20 C compiler and assembler. According to the vendor, it allows the use of multiple execution environments. It employs a window-oriented user interface and allows users to customize screens and viewpoints.

Other features include the ability to use command files, output logging, simulated I/O and interrupts, single-step execution and on-line Help.

Xray68K is priced from $3,500.

Microtec Research, 3930 Freedom Circle, Santa Clara, Calif. 95054.

Updata Software Co. has announced **Version 1.0D** of its IBM DB2 productivity tool, **DB/Proedit**.

DB/Proedit provides access to DB2 tables using an ISPF editor-command format. Version 1.0D provides the ability to specify the maximum number of rows to be displayed in a table. It allow users to automatically commit after every UPDATE, INSERT or DELETE.

Other features include a command to control the translation of alphabetic characters to upper or lower case and the ability to display the status of some commands.

Version 1.0D of DB/Proedit costs $4,500 per year.

Updata Software, 960 Holmdel Road, Holmdel, N.J. 07733.

Woven Software has announced **Version 2** of its **SMFutil**, a general-purpose SMF data movement utility.

Version 2 is said to incorporate the ability to dump SMF data directly from the MVS operating system's Manx files and clear the Manx files. It accepts input from sequential and VSAM sources and can place data to sequential- or VSAM-target data sets.

Other features include the ability to limit the data selected to that required by the user, built-in error detection and recovery capabilities and the ability to extract SMF data from damaged or incomplete data sets without abending.

SMFutil Version 2 is priced at $6,000 for a permanent-site license for the first processor.

Woven Software, 7202 Holder Forest Circle, Houston, Texas 77088.

Apogee has announced **Morehelp**, a general-purpose utility for Hewlett-Packard Co. HP 3000 computers.

Morehelp is said to provide information on HP 3000 system intrinsics, including parameters and options; image data bases and intrinsics; query; Vplus, including intrinsics; scientific, mathematical and compiler libraries; sort/merge; Fcopy; debug; file formats; character codes; and system management.

Morehelp is available on 1600 bit/in. magnetic tape, in manual format and on microfiche. Magnetic tape copies are priced from $195 to $295.

Apogee, 4632 W. Frankfort Drive, Rockville, Md. 20853.

P.E.R. Software, Inc. has enhanced its purge and merge **unduplication software subsystem** for its Mailing List Management System for the IBM System/36 computer.

The subsystem is said to provide a means of eliminating duplicates from name and address lists. Lists can be unduplicated based on name and address or based on address only. The new version includes the ability to specify that the newest or oldest records in a set of duplicates be removed. The user may also specify a primary list, which should contain the retained records of duplicate sets.

The unduplication subsystem is priced at $500.

P.E.R., 38109 87th St., Burlington, Wis. 53105.

MacKinney Systems has announced **Passport**, a program for the VM operating system.

Passport is said to allow a user the option to log on to multiple logical-CMS terminal sessions and connect to multiple-guest virtual operating systems simultaneously. Users may dynamically create or drop up to 12 logical-terminal sessions from one IBM 3278-compatible terminal. Logical-terminal sessions are associates with user-defined keys.

Passport runs on IBM operating systems running under VSM. It costs $1,495 or $595 per year.

MacKinney Systems, 2674-A S. Glenstone, Springfield, Mo. 65804.

Data base management systems

Release K of the **Basis** text information management system has been issued by **Information Dimensions, Inc.**

Release K is said to provide users with an interface to the Basis system, which includes multiple data base access capabilities. According to the vendor, Basis's Host Language Interface allows entrance to data base files from application programs written in the installation's host language. The language interface features 27 layered routines, permitting simultaneous processing on up to 999 data bases, with full data base security functions.

Other features include the ability to extract new document sets from previously retrieved sets, a data loading parameter, scrolling commands and a reentrant Basis version for IBM VM/VMS machines.

First-copy license costs for Basis's central system module start at $15,200.

Information Dimensions, 655 Metro Place S., Dublin, Ohio 43017.

Training software

Innovative Software Solutions, Inc. has added a module to its **Teach Me/3000** series of computer-based training modules for the Hewlett-Packard Co. HP 3000.

The module, using turbo image intrinsics, was designed for users of the HP 3000 who are using HP's Image and Turboimage data base management system software. The module uses examples in Cobol to illustrate methods of accessing the Image and Turboimage subroutines from within application programs. The intrinsic subroutines are grouped by function to be performed, and topics are directly accessible through keyboard commands.

The module is priced at $750 and is accompanied by the Teach Me drive program and an on-line tutorial module.

Innovative Software Solutions, 10705 Colton St., Fairfax, Va. 22032.

Services

Software Automation Corp. has introduced a **2200-to-VS conversion service** for converting Wang Laboratories, Inc. Wang 2200 applications to VS Basic.

The service allows users of 2200 applications written in Basic-2 to move the VS without abandoning existing programming investments. According to the vendor, percentage of conversion is as high as 85%, depending on the complexity of the program. The vendor has also announced the ability to transport consecutive and indexed 2200 files to VS data files. The service is priced from $10 to $45 per program, depending on the number of programs.

Software Automation, 2131 White, Houston, Texas 77007.

Development tools

Phase Linear Systems, Inc. has announced **The Exec Productivity System** (EPS) for users of MVC Corp. Rexx and Exec 2 under the IBM VM/CMS operating system.

EPS is a collection of integrated tools providing protection, security and function integration for programs written in Rexx or Exec 2. It is said to encode Exec programs and convert them to CMS modules so that source logic and other sensitive information, such as passwords and user IDs, are not accessible to users. EPS is priced at $3,500.

Phase Linear Systems, 1850 K St. N.W., Washington, D.C. 20006.

Uniq Digital Technologies, Inc. has announced **Decport**, Unix System V, Release 3 in source form for Digital Equipment Corp. VAX processors.

Decport is said to be a direct port from AT&T's Unix System V, Release 3 for the VAX. It includes all the development, in source form, performed by Uniq since its initial port of System III in 1979.

Source fees for Decport are $25,000.

Uniq, 28 S. Water St., Batavia, Ill. 60510.

Genesis V, an expert software system said to allow users to design IBM System/38 applications using artificial intelligence techniques, has been announced by **Help/38 Systems.**

Genesis V allows users to add their own lines of code to the generated RPG III source. Genesis V is said to learn those lines of code and put them in the correct logical place when the source is regenerated. Genesis V also allows users to write to their own standards for system design and system operation. The system includes a programming knowledge base and an interactive specification data base. Genesis V costs $14,950 per CPU.

Help/38, 210 Baser Technology Plaza, 6101 Baser Road, Minnetonka, Minn. 55345.

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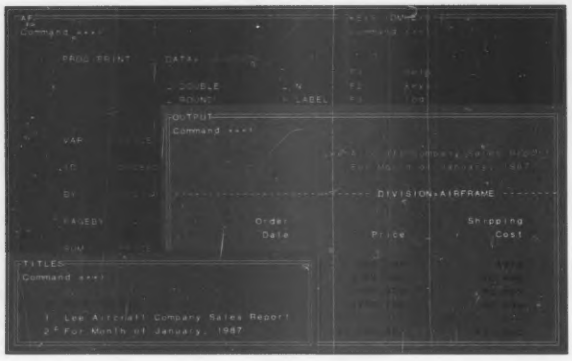

2 Connectivity. With the SAS System for personal computers, you get a built-in link to your host SAS System. You can download corporate data; develop, test, and run applications on your PC; or move data and applications back to the host for execution. Plus the SAS System reads data from any kind of file, including dBASEII,® dBASEIII,® and Lotus® 1-2-3.®

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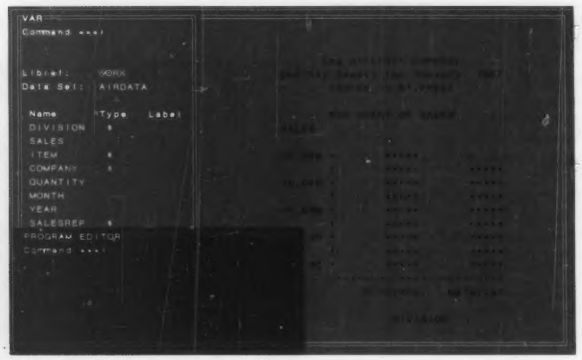

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The SAS System runs on the IBM PC XT and AT, IBM 370/30xx/43xx and compatible machines, Digital Equipment Corporation's VAX™ and MicroVAX II,™ Data General Corporation's ECLIPSE® MV series, and Prime Computer, Inc.'s 50 series. Not all products are available for all operating systems.

SMALL TALK

William Zachmann

An old dog's new tricks

There is nothing better, when encountering an old friend, than to find out that he has gotten even better since the last encounter. That describes my impression of Popdrop Version 3.0 from Infostructures, Inc. in Tucson, Ariz.

Recently enhanced in Version 3.0, Popdrop is billed as "The Memory Management Utility" and is extraordinarily simple in concept. The tool is a memory-resident utility, or terminate-and-stay-resident (TSR) program as it is commonly called. Popdrop's function, however, is to help you manage other TSR programs.

While TSR programs are tremendously useful, they can also be a pain in the neck. Although the functions they perform are often highly desirable, the programs take up memory, sometimes get into bizarre and destructive interactions with each other and require different steps to get out of memory — if they can be removed at all. Often, the only way out is to simply reboot the system.

Popdrop takes care of all

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Televideo unveils workstation

Says Telestar/386 an inexpensive challenge to DEC, Sun, Apollo units

BY ED SCANNELL
CW STAFF

SUNNYVALE, Calif. — Televideo Systems, Inc. jumped into the engineering workstation market last week with an Intel Corp. 80386-based system the company claimed will cost about half as much as competing systems from Digital Equipment Corp. and Apollo Computer, Inc.

Christened the Telestar/386, the system contains a 16-MHz version of the 80386 processor and a 10-MHz 80387 coprocessor and allows users to run applications compatible with both AT&T's Unix System V, Release 3 and Microsoft Corp.'s MS-DOS concurrently under Microport Systems, Inc.'s MS-DOS Merge 386 operating environment.

While most engineering systems use the Motorola, Inc. 68000 processor, Televideo decided to use the 80386 because it can volume-purchase the 80386 processors less expensively, according to Philip Hwang, Televideo's chief executive officer. The 80386 also gives engineers, the majority of whom have Unix-based systems, access to MS-DOS-compatible applications, Hwang added.

"Most existing workstations are based around the 68000, but that market [engineering workstations] is a niche market. Because of the [greater] volume of the 80386, we can procure it at a lower cost," Hwang said.

Hwang said he believes the system will attract a rather diverse group of engineers that have been kept out of the workstation market because of price. The system ranges in price from $3,995 to $15,995.

Televideo said it will announce another 80386-based system at Comdex/Spring '87 next week. That system runs MS-DOS and will be used primarily as a file server, Hwang said. The company said it will also announce a terminal at the show.

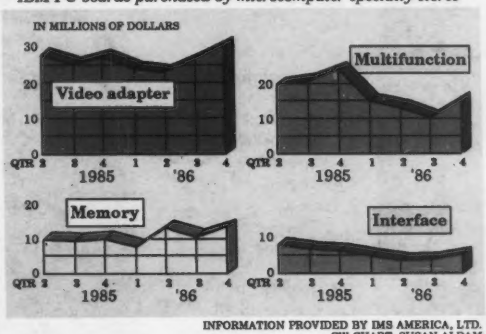
The Telestar/386 will support X Windows, developed by MIT, which runs several applications simultaneously.

Televideo said the Telestar/386 will be available in July.

Data View

Add-in boards

IBM PC boards purchased by microcomputer specialty stores



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CW CHART: SUSAN ALDAM

Cards rev up publishing

BY JOSEPH FUSCO
SPECIAL TO CW

Users of IBM and compatible microcomputers cheered when Aldus Corp. released its long-awaited version of Pagemaker desktop publishing software. No longer would they endure Apple Computer, Inc.'s superiority in this new application. The IBM Personal Computer AT family of users, with an Intel Corp. 80286 at its disposal, might rejoice.

But the silver lining held a cloud for users of Intel 8088-

Continued on page 41

Wang line of micros enhanced

BY DOUGLAS BARNEY
CW STAFF

Despite an impending announcement of a line of microcomputers, Wang Laboratories, Inc. last week enhanced its existing Professional Computer and Advanced Professional Computer.

The enhancements include use of Microsoft Corp.'s MS-DOS 3.2, support for Xenix System V on the Advanced Professional Computer and a new mouse.

Wang claims some 400,000 users of the Professional Computer and Advanced Professional Computer and is enhancing the units to protect user investments. "A customer base of that size is of strategic importance," said Win Burke, Wang's director of desktop systems.

Observers said that Wang could have sold many more Professional Computers and Advanced Professional Computers, but the machines lacked total hardware compatibility with the

Continued on page 39

Inside

- Intel puts 80387 math coprocessor on the retail market. Page 39.
- Abra Cadabra Software releases Version 5 of its human resource system for IBM PCs and compatibles. Page 44.

Colvin: Micro Channel, PS/2 don't meet hype

This is the conclusion of a two-part series.

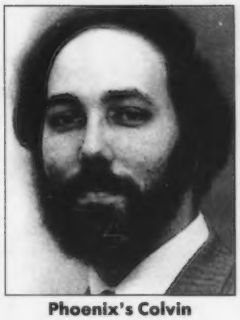
Neil Colvin is founder, chief executive officer and chief scientist at Phoenix Technologies Ltd., a custom engineering firm.

During the last several years, the company has made its reputation providing ROM BIOS products compatible with IBM's Personal Computer series to several major systems manufacturers.

Colvin is a good example of why one should put little faith in stereotypes of technical engineers. While some have made a lifestyle out of coding until midnight and living off pizza and Pepsi, Colvin has created a proper balance between work and his involvement in local theater.

Colvin, 37, has planned work and business trips around his involvement in writing, producing, directing and acting in local musical productions. He reluctantly tore himself away from a starring role in his latest production, "The Music Man," to talk with *Computerworld* Senior Editor Ed Scannell about another subject close to his heart: IBM's Personal System/2 and the issue of cloning it.

Is IBM's Micro Channel a duplication in miniature of the Multiplex channel IBM has used for years in its mainframes? Is there any technological relationship?



Phoenix's Colvin

The Micro Channel is not a channel by any of IBM's definitions. All it is is an internal bus. It doesn't have any of the characteristics of IBM's channels. They [IBM] used to have data cables and tag cables floating around for mainframes and peripherals daisy-chained around the room. That is a channel. This is not a channel, it is a bus. The closest thing we have to a channel is the Scuzzy bus.

What is the level of interest among manufacturers to bring back the Personal Computer Extended Technology Committee (PCETC) you helped organize last year?

I think there is a lot of concern on the part of manufacturers about the abandonment [by IBM] of the old standard. The other thing is there is a growing rebellion in Fortune 2,000 companies against IBM because they aren't providing an evolutionary path from the existing architecture. Users have to throw away all their cards.

The Micro Channel provides no user benefits that I can see at this point. There is nothing that the Micro Channel does that the user needs. The system's self-configuration — which eliminates dip switches — is nice, but we don't spend eight hours a day flipping DIP switches on our boards. I mean, this is not a big issue.

There is a very interesting problem associated with that. It seems like it is almost impossible to do multifunction boards for the Micro Channel. There is a limitation to how many bits of information the board can get back into the system on one board. If

Continued on page 40

Kurzweil to add intelligent scanner

Font-recognition ability seen as advantage over optical counterparts

BY DAVID BRIGHT
CW STAFF

CAMBRIDGE, Mass. — By using the software technology of its $40,000 intelligent character recognition (ICR) scanner, Kurzweil Computer Products, Inc. recently said it has developed an IBM Personal Computer-based unit selling for $9,950. The company, which is set to formally introduce the scanner at Comdex/Spring '87 next week in Atlanta, has also cut the price of its Kurzweil 4000 ICR system in half, to $19,950.

According to Kurzweil, the new Discover 7320 scanner can recognize a much greater variety of fonts than traditional optical character recognition (OCR) scanners. This is especially important as more and more laser printers — with their abilities to produce many different types of fonts — find their way into the office, Kurzweil said.

Initially targeted for reseller channels, the unit was designed for office work groups that need to input relatively small volumes of printed text and graphics into their PCs. It is reportedly able to scan material and feed it into a PC while the PC is running other applications.

Already trained

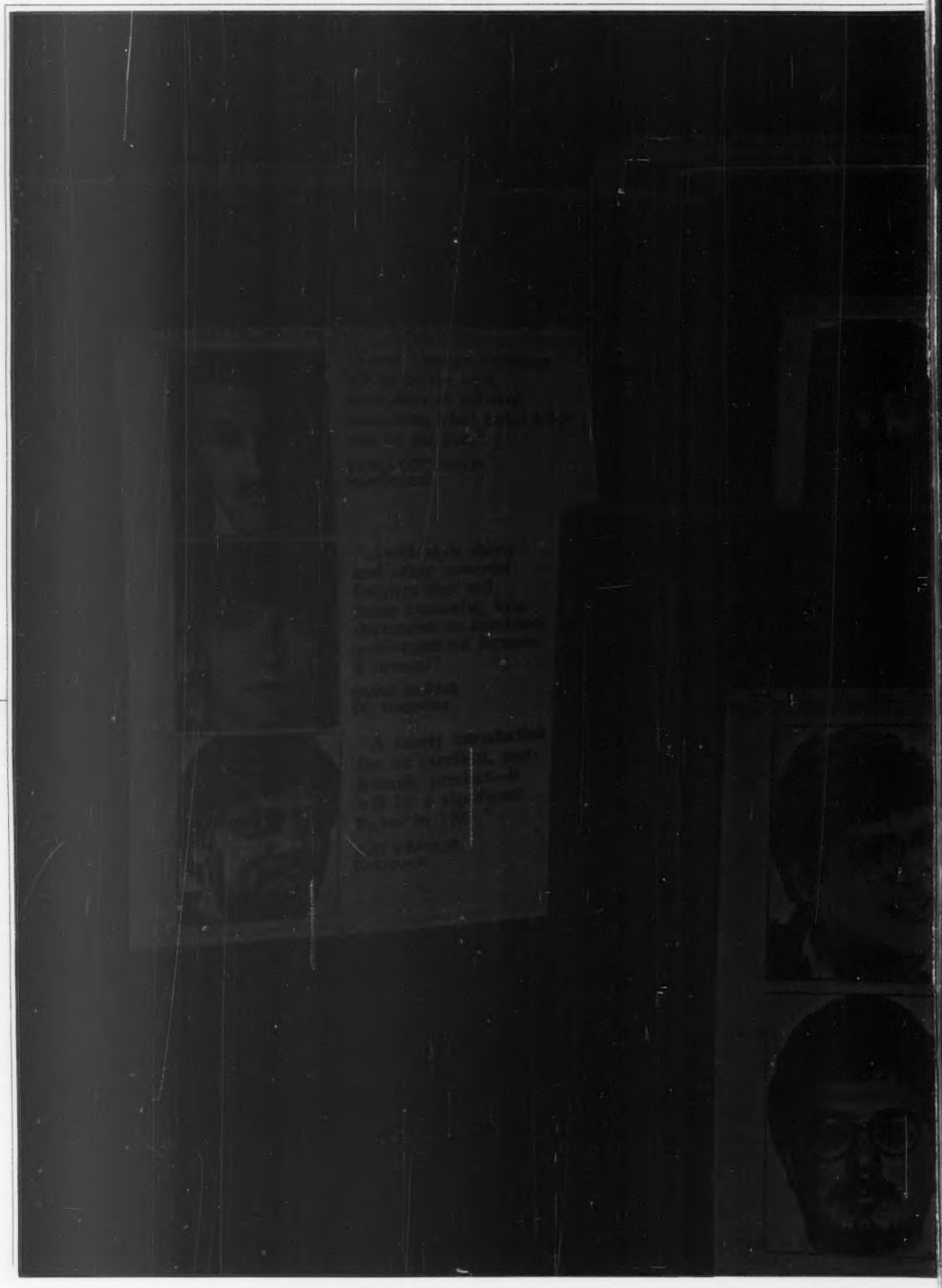
Compared with the larger scanner, the Discover 7320 has lower resolution — 300 by 300 pixels vs. 670 by 400 pixels — and does not require the user to "train" it before scanning.

One analyst who saw the Discover 7320 on a nondisclosure basis said he was impressed with the product and added that the superior ICR technology is forcing most OCR vendors to build ICR scanners also.

"In the olden days of daisy-wheel printers and typewriters, you only had so many fonts in the office," and the template matching method used in OCR scanners was sufficient, he said. "But now, with these laser printers producing so many fonts, it's no longer sufficient to just have one, or two, or 10 fonts anymore." Instead of comparing scanned text with text in a template, ICR scanners recognize text by analyzing it and teaching themselves as they go along.

The Discover 7320 system consists of a scanner, software and a Motorola, Inc. 68020-based board that fits into the PC.

The software converts scanned text into a variety of word processing formats, such as Microsoft Corp.'s Word and Micropro International Corp.'s Wordstar. One document can reportedly be converted into several different formats. Other features are said to include selective scanning of certain parts of a page and automatic graphics avoidance for skipping over letterheads and other unnecessary material.



Intel ships 80387 math chip to retail market

HILLSBORO, Ore. — Intel Corp.'s Personal Computer Enhancement Operation (PCEO) recently began shipping the first 80387 math coprocessors intended for retail sales.

Designed to be used with the 80386 microprocessor, the 32-bit chip reportedly performs floating-point calculations four to six times faster than the earlier 16-bit 80287 math coprocessor.

Priced at $795, the 80387 has a clock speed of 16 MHz and operates in personal computers built around the 80386 chip and in systems using PCEO's Inboard 386 accelerator board.

According to Intel, an Inboard 386 with an 80387 processes floating-point operations 200% faster than a combination of the Inboard 386 and a 10-MHz 80287 math coprocessor.

Math-intensive applications are said to run 15% to 25% faster with the 80387 than with the 80287.

Because the 80387 is compatible with both the 8087 and 80287 math coprocessors, software written for those chips by more than 100 independent vendors can take advantage of the increased speed, according to the company.

Such programs include Lotus Development Corp.'s 1-2-3, Autodesk, Inc.'s Autocad and Borland International's Turbo Pascal.

Lag time

The availability of the 80387 comes eight months after the first 80386-based systems were introduced.

Earlier this month, Compaq Computer Corp. announced that it had added a socket for the 80387 on the system board of its Deskpro 386.

Compaq said that it will offer system-board upgrades for current Deskpro 386 machines.

Wang micros

FROM PAGE 37

IBM Personal Computer. The new Wang microcomputers, based on Intel Corp.'s 80286 and 80386 processors, will be announced "shortly" and will be fully hardware-compatible with the IBM PC, XT and AT, according to the company. The machines are not expected to be hardware-compatible with IBM's new Personal System/2 line.

The use of MS-DOS 3.2 is said to improve the compatibility of the machine by allowing IBM PC and Wang software to be run from the same Wang menus. Since MS-DOS 3.2 is used on the Wang Laptop and will be used on the still-unannounced line of Wang microcomputers, compatibility among the Wang line will be improved.

With Xenix System V, which is offered as an option for the Advanced Professional Computer, up to eight users can access the Advanced Professional Computer simultaneously. Xenix System V replaces Xenix System III. In an effort to optimize the use of Xenix System V on the Advanced Professional Computer, Wang plans to offer a $995 expanded high-speed system memory board with up to 5M bytes of random-access memory, a $2,500 streaming-cartridge tape drive and a $750 multiple-terminal controller.

A new $150 Wang M7 mouse for the Professional Computer and Advanced Professional Computer handles multiple mouse formats.

New tricks

FROM PAGE 37

that. It lets you move TSR programs in and out of memory simply and easily. Either manually or through batch files, Popdrop gives you complete control over what memory-resident routines are currently loaded and in what order.

With Popdrop Version 3.0, you can create up to 16 layers of memory-resident programs, up from eight in Version 2.0. The earlier version required about 1.5K bytes for each layer of programs loaded. Version 3.0 only takes about 600 bytes for the first layer and 200 more for each additional layer.

The key to this economical use of memory is that Popdrop is not a TSR program in the usual sense. The program itself is invoked from disk when needed. Instead, Popdrop uses the TSR strategies with DOS to simply leave needed data in memory to let Popdrop do its job.

When active, Popdrop rearranges DOS memory allocation tables and vectors among the true TSR programs to achieve the desired results.

As in the previous version, Version 3.0 lets you add and delete individual programs as well as entire layers of programs.

In addition, Version 3.0 makes it possible to activate and deactivate individual layers at will. That way, you can turn off TSR utilities and restart them later without having to remove and reload programs.

Diagnoses and corrects

In addition to providing excellent facilities for managing TSR programs, Popdrop Version 3.0 adds capabilities to diagnose and correct unhappy reactions among them. A Hooks command conveniently displays the DOS interrupt vectors used by current resident programs.

This can be a big help in the hands of a sophisticated user in sorting out what is clobbering what and why when conflicts among memory-resident programs are suspected.

Popdrop is not copy protected. At only $49.95, Popdrop Version 3.0 is a terrific bargain. Users of earlier versions can upgrade to Version 3.0 for $30. It runs on all IBM Personal Computers, including the new Personal System/2 models, with all versions of Microsoft Corp. MS-DOS and IBM PC-DOS 2.0 through 3.3.

Zachmann is vice-president of research at International Data Corp.

Colvin

FROM PAGE 37

you have a board with 14 or 15 functions on it, like serial, parallel, clock, memory or power, there seems to be no way in the specification to have that board go into the Micro Channel machine.

The other advantages are burst-mode direct-memory access and the multimasters. The burst-mode direct-memory access is important because it gives you high-speed, nonbuffered mass storage devices. With peripherals that are buffered on the controller board, the PCETC's bus burst-mode direct-memory access is virtually identical in terms of performance. The third thing is multimasters should be able to support three or four masters on the bus or a couple of coprocessors of some form. That is nice, but why do we need it? What applications, besides some pretty bizarre things with custom hardware, do you see using coupled processors on the bus in the future?

What are the possibilities?

Well, I'll tell you what I see. You can take a whole different look at the [PS/2] announcements and see that IBM didn't announce a new line of personal computers but in fact was getting out of the personal computer business. What they are doing is announcing products to go after Digital Equipment Corp. I mean, the [PS/2] Model 30 is ridiculous and will maybe be sold to the education market. No person in their right mind would buy one unless they were forced by management to do so.

The [PS/2] Model 50 is a terrible performance machine. It has a slow disk drive and has only three slots that can't be expanded. It's a silly personal computer.

IBM's argument is that they have created a more balanced architecture in the Micro Channel that lets it run faster than it appears to on paper.

Load up the disk with 20M bytes of data and then see how fast it does disk reads and writes.

Even with its disk-caching feature?

It degrades more than the PC AT does. There is something in there, I don't know what it is, but it degrades incredibly rapidly. But the Model 50, given its price, there are better machines on the market. The AST Research, Inc. Premium 286 runs rings around it for less money.

So the interesting machines are the [PS/2] Models 60 and 80. They aren't designed as personal computers but as departmental servers. Now whether they are designed as [DOS] 3X replacements or a new line of things complementing the 3X is hard to say. But if that's the case, tightly coupled processors make sense. So, does that mean 370 boards? Probably. Does that mean 3X boards? Probably.

You can see those machines as the basis for providing departmental servers that provide backward compatibility for existing product lines. That is why you would need tightly coupled processors. Now that's a very unique niche market. It is not the majority of the market. It is also going into a market where DEC now has the lead.

What do you think of Microsoft Corp.'s MS OS/2?

Well, [Microsoft Chairman] Bill Gates said it well. MS OS/2 is a product for two years from now. We are talking about the end of next year before we have a product you can write applications to. Also, there is no relationship between OS/2 and PS/2. OS/2 will run on every IBM PC AT in the field. We don't think OS/2 will be used by more than 20% of the machines in the field.

Cards rev up

FROM PAGE 37

based PC XT compatibles.

First, Pagemaker must be used with a mouse. Second, the program requires a hard disk, a graphics environment and Microsoft Corp.'s Windows. Serious PC XT users already have hard disks. Graphics, particularly minimal IBM Color Graphics Adapter (CGA) graphics, are expected by desktop publishers.

But Windows traumatizes PC XT users, most of whom know this operating environment only by its reputation for sluggishness.

Perhaps Aldus sensed this as well, for Pagemaker's third significant requirement calls for PC AT-type machines.

The card's the thing

Will desktop publishing force PC XT users to buy new computers? Thanks to the following simple upgrade, the answer is no. The key is an accelerator card. Accelerator cards boost the processing speeds of PC XT-class computers from 4.77 MHz to between 8 and 12 MHz.

This increase is essential for advanced desktop publishing programs that need faster processing to shorten wait times.

But processing represents very little of a microcomputer's work. Throughput, the real measure of work accomplished, depends upon slow 8-bit data paths, slower disk-access times, very slow printers and criminally slow keyboard entry.

Great expectations

Realistically, users can not improve throughput by 100% to 200% simply because their accelerator card's processor calculates that much faster. Yet in special situations, like desktop publishing, accelerator cards really perform.

PC XT-class users who already have a mouse will find that any accelerator card will run Windows/Pagemaker at an acceptable speed.

Some popular cards are MCT's Speed Demon, Micro Way, Inc.'s Number Smasher, Microsoft's Mach 10, PC Technologies, Inc.'s 80286 board, Orchid Technology, Inc.'s Tiny Turbo and Quadram Corp.'s Quadsprint. These typically cost between $400 and $600.

Those without a mouse will quickly find their selection narrowed to Microsoft's Mach 10. For about $500, the Mach 10 package includes a mouse, which saves spending another $200 (and perhaps using another precious bus slot).

With an accelerator board supported by a hard disk, CGA graphics, Windows and a mouse, PC XT Pagemaker users are ready to publish. But a few other items deserve consideration.

The accelerator card solution is directed at the PC XT owner who uses desktop publishing along with other applications, such as word processing and spreadsheets. This "mixed-application" user, as demonstrated, does not require a PC AT-type machine.

Full-time desktop publishers, in contrast, will want to buy another computer anyway, so it might as well be in the PC AT-class.

Between the occasional and full-time desktop publisher lies the middling user who, for example, anticipates three to five weeks of publishing every quarter. This user can stay with a PC XT given the following caveats.

Disk I/O might be too slow for the middling PC XT user. Disks with 40-msec head-access times, instead of the more common 70-msec access times, will solve this problem, but a random-access memory (RAM) disk is better.

The 640K-byte memory limit typical of PCs and PC XTs forces desktop publishing programs into repeated disk accesses when making document changes. Here, even a 40-msec disk will probably be too slow for the mid-level user.

The answer is extended memory configured as a RAM disk. For about $400, add-in memory, such as Intel's Above Board or AST Research, Inc.'s Rampage, provides the extra speed that many users require.

If bus-slot availability becomes a problem at this point, look for multifunction products like Intel's Above Board PS/PC, which includes a serial port, parallel port, clock, calendar and up to 1.5M bytes. Note that 256K-byte RAM chips are not included in the basic price, but one 256K-byte RAM chip may be enough for desktop publishing.

Too many cooks . . .

Mid-level PC XT users must plan their desktop publishing upgrades carefully to avoid running out of bus slots. The multifunction Microsoft Mach 10 accelerator/mouse card and the Intel Above Board PS/PC offer two immediate solutions.

Using a serial-port mouse, an external modem or opting for an expansion chassis may also help. But too many add-ons, no matter how cleverly configured, can quickly justify the cost of a new PC AT-type machine.

Micro Way's combination accelerator/memory card is an excellent multifunction solution for the PC XT desktop publisher with only one more bus slot. The $1,280 Micro Way card with a cooling fan (but without a mouse) is the only alternative for this "tight-fit" upgrade.

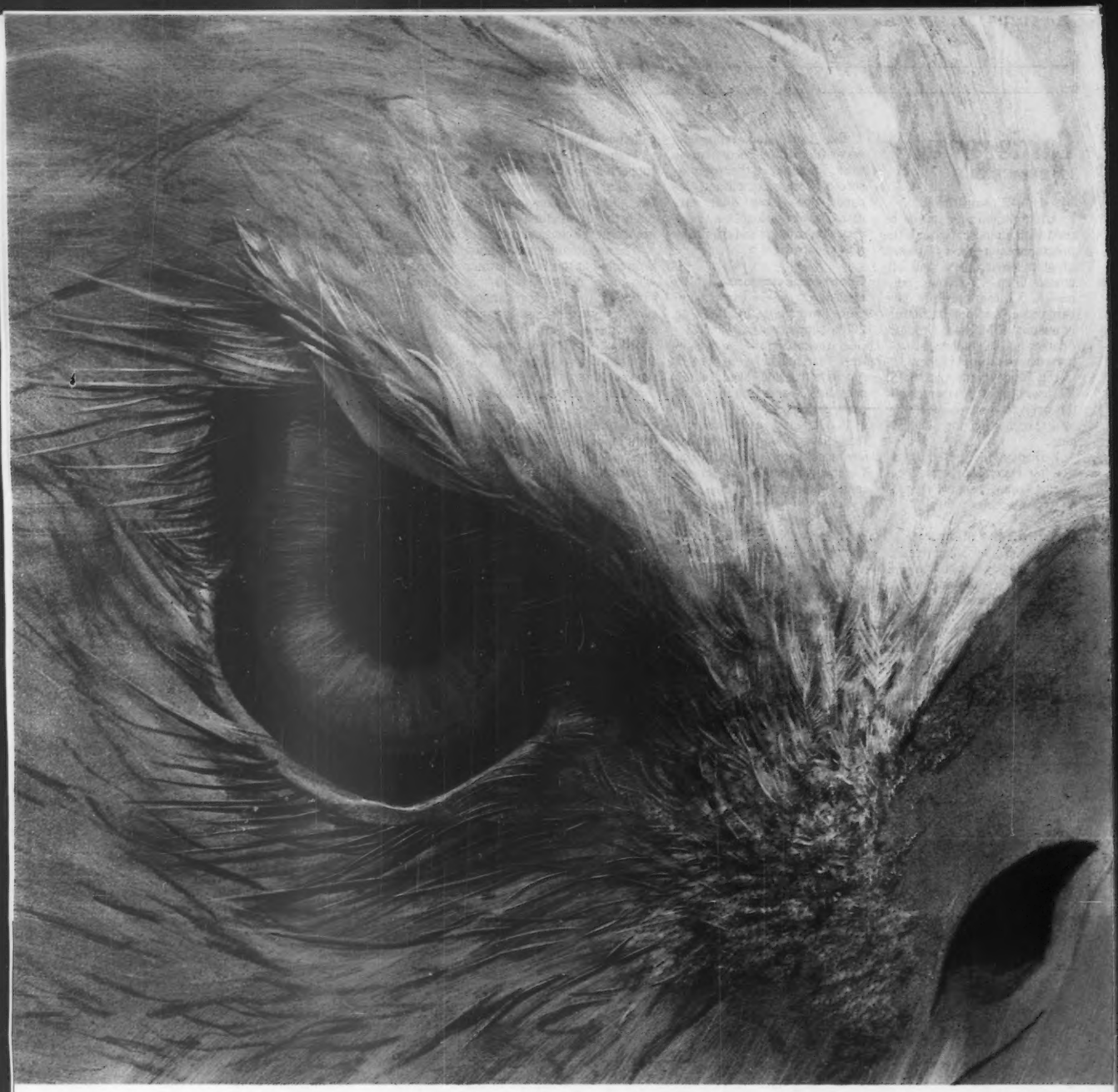
Adding it up

With $800 to $1,000 invested in an accelerator card, mouse and add-in memory, the PC XT desktop publisher will remain $900 to $1,100 less expensive than the cost of even an Asian PC AT clone. But adding an expansion chassis and 1.5M bytes of 256K-byte RAMs tips the cost scales in favor of selling the PC XT and buying a PC AT.

The final word on this upgrade concerns networking and peripheral management. Apple recently announced a half-card emulator for the PC XT. This will allow PC XT Pagemaker users to plug into an existing Apple network and access an Apple Laserwriter printer.

In summary, the Pagemaker-PC XT connection is not for everyone, but where it works, accelerator cards make it work just as fast as a Mac Plus.

Fusco is a microcomputer consultant with expertise in desktop publishing.



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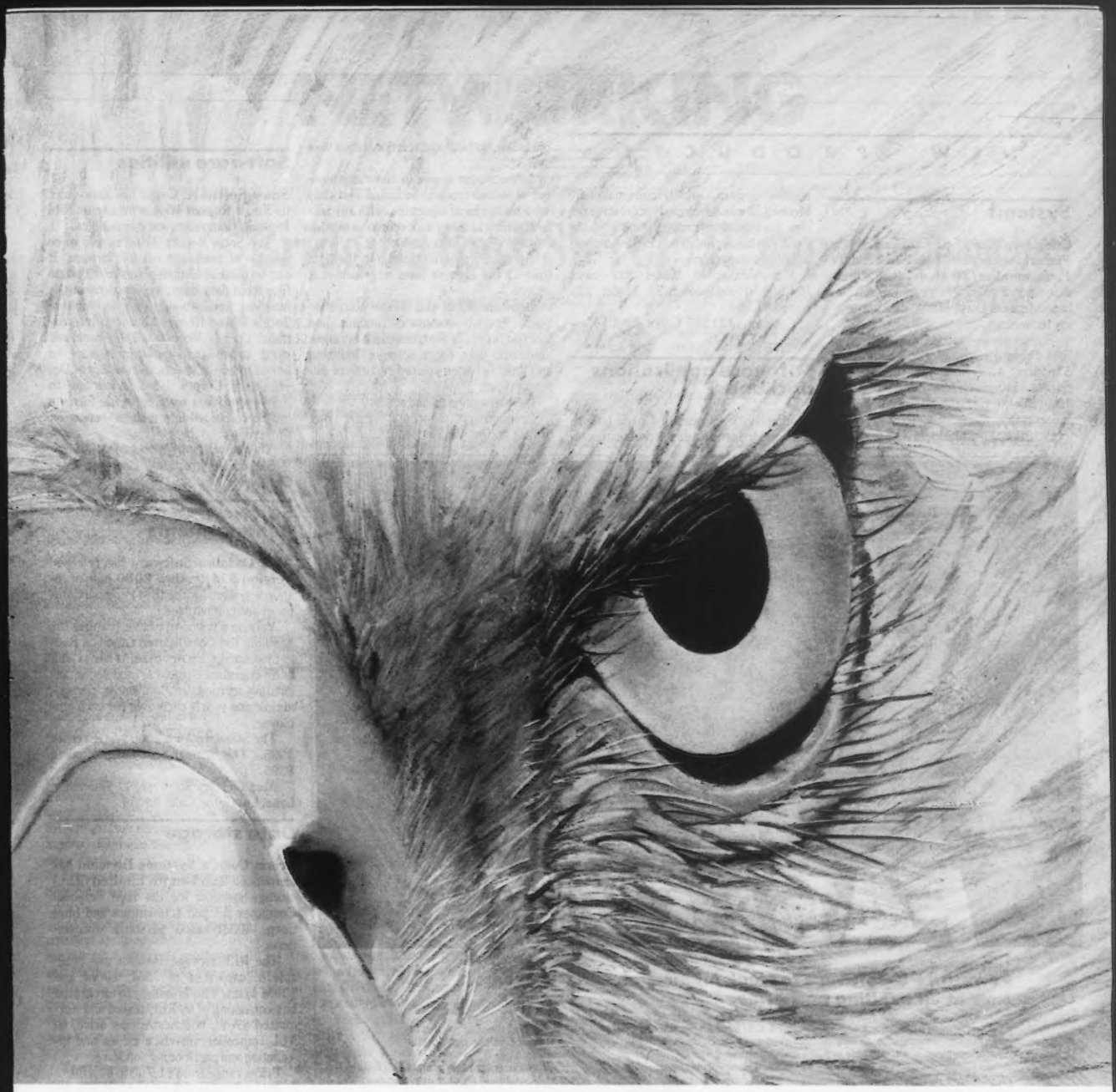

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NEW PRODUCTS

Systems

Cubicomp Corp. has announced the **Picturemaker/30 Model 332** and the **Picturemaker/20 Model 322**, three-dimensional computer graphics systems based on Intel Corp. 80386 microprocessor technology.

The systems include an 80386-based IBM Personal Computer AT-compatible computer with hard and floppy disk drives, a red-green-blue color monitor, a data tablet, a CS/16 digital frame buffer and software.

Picturemaker/30 Model 332 is an animation system, and Picturemaker/20 Model 322 was developed for creative design presentations and corporate graphics. It can be upgraded to a Picturemaker/30 animation system.

Picturemaker/30 Model 332 costs $54,500. Picturemaker/20 Model 322 costs $41,500.

Cubicomp, 21325 Cabot Blvd., Hayward, Calif. 94545.

Software applications packages

Productivity Concepts Corp. has introduced **Infomanager**, a personal computer hierarchical and relational data base system.

Infomanager is said to allow any number of record types to be linked vertically via a hierarchical structure, with any record owning as many subrecords as needed to store related information.

All data can be inserted into the data base at the highest level at which it is unique.

Infomanager is said to use conversational English commands, menus and function keys. It features Help screens, automatic data entry screens, indexing and links between related records of different types.

Infomanager is priced at $249.

Productivity Concepts, P.O. Box 3088, Oakton, Va. 22124.

Software utilities

Snow Software Corp. has announced its **Snow Report Writer** for use on IBM Personal Computers and compatibles.

The Snow Report Writer is said to be capable of reading most file formats. It can be used as a stand-alone or with data files from data base, word processing or business applications, such as Ashton-Tate's Dbase III and Micropro International Corp.'s Wordstar. Data base and word processing applications can be linked to spreadsheets such as Lotus Development Corp.'s 1-2-3. According to the vendor, data from eight file formats can be combined into a single report on the screen.

The Snow Report Writer costs $695.

Snow Software, 2360 Congress Ave., Clearwater, Fla. 33519.

Software enhancements

Abra Cadabra Software has released **Version 5** of its **Abra 2000** human resource system for the IBM Personal Computer and compatibles.

Version 5 is said to include features for handling the Consolidated Omnibus Budget Reconciliation Act benefits law as well as an attendance-tracking module for calculating accrued vacation, illness, personal time and yearly carryover for each employee.

The Standard Abra 2000 system costs $995. The attendance module costs $395.

Abra Cadabra Software, 11 Worcester Lane, Los Gatos, Calif. 95030.

Data storage

Priam Corp.'s Systems Division has introduced **Run Length Limited** (RLL) storage systems for the IBM Personal Computer AT and compatibles and Intel Corp. 80386-based personal workstations.

The RLL storage systems are available in capacities of 75M, 100M and 230M bytes. The systems are integrated kits consisting of an RLL-tested and -formatted 5¼-in. Winchester disk drive, an RLL controller, interface cables and installation and partitioning software.

Prices range from $1,700 to $4,100.

Priam Systems Division, 20 W. Montague Expwy., San Jose, Calif. 95134.

Printers/Plotters/Peripherals

Qume Corp. has unveiled **Correspondence**, **Business** and **Financial** application-specific daisywheel printing systems.

The Correspondence package includes the 45 char./sec. Letterpro Plus printer, the Qume Profeeder 10, Wordperfect word processing software from Wordperfect Corp. and the Turbo Lightning on-line spell-checker and thesaurus from Borland International.

The Business package includes the Sprint 11/55 55 char./sec. printer and Turbo Lightning. The Financial Package includes the 50 char./sec. Sprint 11 Plus 130 printer.

Prices for the Correspondence, Business and Financial packages are $1,195, $2,195 and $2,995, respectively.

Qume, 2350 Qume Drive, San Jose, Calif. 95131.

NETWORKING

DATA STREAM

Clare Fleig

Cooking up SAA strategy

This is the conclusion of a two-part series.

Last week, we summarized elements and functions of IBM's Systems Application Architecture (SAA), taking a look at the long-term goals for SAA and two SAA categories: the Common User Interface and the Common Programming Interface. This column will explore IBM's plans to implement an open, yet Systems Network Architecture (SNA)-dependent, strategy through the Common Communications Support element of SAA. It will also look at SAA migration issues confronting both IBM and third-party developers.

Common Communications Support is being implemented for a range of currently available IBM communications products and architectures. At its most basic, Common Communications Support provides the method by which applications developed by IBM or third parties perform shared tasks such as file sharing, data storage and creation of mail services.

Initially, the architectural support will include data streams (IBM 3270 data stream, Document Content Architecture, Intelligent Printer Data Stream); applications services such as

Continued on page 47

Bridging the OSI-TCP/IP gap

DEC, Network Research supply computers, software for NBS project

BY ELISABETH HORWITT
CW STAFF

Digital Equipment Corp. and Network Research Corp. have agreed to provide computers and software for a new National Bureau of Standards (NBS) project to develop gateways between Open Systems Interconnect (OSI) and Department of Defense networking applications that run with Transmission Control Protocol/Internet Protocol (TCP/IP).

The protocols, which are part of the Defense Department's effort to migrate to the OSI networking standard, will also be available to vendor and user organizations as public domain software, noted Kevin Mills, chief of the NBS Systems and Network Architecture division. Once the gateway specifications are completed, the Defense Communications Agency will incorporate them into its procurements for gateway products. In the meantime, NBS will develop prototype gateways that "prove the specifications are workable and give interim capability that can be used as testing until the procurements are finished," Mills noted.

NBS plans to release specifications this summer for a gateway between the Defense Department's Simple Mail Transfer Protocol and OSI Message Handling Facility/X.400 electronic mail protocols. At approximately the same time, NBS said it plans to have developed a system for testing whether products comply with the gateway specifications. A gateway between the military's File Transfer Protocol and OSI File Transfer, Access and Management protocol is planned for release in January 1988 with a testing system to be available in March of that year.

DEC and Network Research are the first vendors to respond to NBS's request for computer equipment and software for the gateway development effort; a third vendor, whose name has not been released by NBS, may

Continued on page 52

UPDATE

Get more from leased lines

BY LEONARD A. HINDUS
SPECIAL TO CW

Data compression is a simple yet effective way to battle rising telecommunications costs. And merging data compression with another basic communications technology — statistical multiplexing — creates a data transmission technique that is raising eyebrows and lowering telecommunications bills in many DP shops. Here are a few examples:

- By installing multiplexer/compression devices, Metropolitan Life Insurance Co. achieved a 60% reduction in the number of point-to-point leased lines, garnering savings in excess of $2 million a year. The devices were installed in the company's existing IBM Systems Network Architecture (SNA) network without any degradation in

Continued on page 50

ANTHONY RUSSO

Groping for keys to net managing

BY DONNA RAIMONDI
CW STAFF

ATLANTA — Users and vendors tried — and failed — to define the key components of a good network management system during the spring meeting of the Network Users Association (NUA) held here recently.

Defining network management is difficult because each network is different, said Peter Pappas, director of telecommunications at Combustion Engineering in Stamford, Conn., and chairman of the NUA's network management subcommittee.

"I would like to make a report card with a list of management issues that would be as useful to the little network as to the big one," Pappas said during a conference workshop.

Pappas produced an 11-item list for the proposed report card, which included everything from host-access method failures to historical network performance data. NUA members commenting on the list, however, said that they did not consider all of those items to be part of network management.

Programmer and network

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Conference tool talks to E-mail systems

BY ELISABETH HORWITT
CW STAFF

DANBURY, Conn. — Interaction with IBM Personal Computer software and host-based electronic mail systems are among the enhancements that have been added to Adesse Corp.'s Contact VM/SP Computer Conferencing, a product designed to add value to IBM's Professional Office System (Profs).

The fruits of a two-year development project at Adesse, Contact Release 2.0 is said to include more than 50 enhancements, including a full-screen user interface and interaction with electronic mail systems such as Profs, CMS/Notes, Digital Equipment Corp.'s All-In-1 and RFC822, an electronic mail system that runs on the Department of Defense's Arpanet.

While Profs provides electronic mail services and document management with "limited many-to-many communications," Contact provides an asynchronous electronic-conferencing and bulletin board service for multiple users within the IBM CMS environment, according to Adesse's Tom Foth. Users can make information generally available, or "ask anyone who happens to be around a question," Foth said.

Another Contact feature, key word search, allows users to call up all documents on file that relate to a given subject. "So when you have a question you can check to see whether it has already been asked and call up the expert's answer," Foth said.

Contact 2.0 can be interfaced with any electronic mail system through a programming effort of approximately one man-week, Foth said. Interfacing with an IBM PC file-transfer package takes approximately one day, he added. Support for VM Personal Computing, Inc.'s Relay and Columbia University's Kermit file-transfer program are built into Version 2.0's PC interface.

Also introduced with the release is an exclusion facility that allows users to tune out of bulletin board exchanges when they are not interested in the subject. Users also can monitor access to a file to determine what audience their information is reaching. A new full-screen menu feature is consistent with the Profs format. Line- and command-mode menus are also available with the system.

Future enhancements are slated to include file-sharing with full security and conferencing for users on multiple VM systems. The latter feature will be available through IBM's TSAF and the VM/SP 5 operating system, Foth said.

Contact 2.0 is priced at $15,000 for purchase or $350 per month to lease.

AT&T to cut long-distance rates again

WASHINGTON, D.C. — AT&T plans to lower direct-dial interstate long-distance prices by approximately 4.8% at all hours, effective July 1.

This latest price cut will bring reductions in AT&T's long-distance prices to nearly 16% this year, and nearly 34% since the Bell system was broken up in 1984, AT&T said.

Beginning July 1, there will be a 60-cent increase in the current $2 fee that homes and small businesses pay local phone companies to cover part of the fixed costs of connecting their telephones to the local exchange.

In turn, the local telephone companies are lowering the charges AT&T and other long-distance companies pay for communications access to customer's homes and businesses.

This means AT&T will save approximately $590 million in lower access costs, passing along the savings to customers — dollar for dollar — by reducing long distance prices.

In addition, AT&T petitioned the Federal Communications Commission on May 15 to approve the following reductions:

- Cut Reach Out America's initial hour and evening option fees by 4.8%.
- Cut AT&T's Pro America I, II and III family of services by 4.8%. The FCC was also requested to approve adding AT&T card calls to the plan.
- Cut AT&T's 800 Readyline usage prices by 4.8%.

SAA strategy

CONTINUED FROM PAGE 45

SNA Distribution Services, Advanced Program-to-Program Communications and Low Entry Networking; and two industry networking standards — CCITT X.25 and the Token-Ring. As the specifications evolve, other products, including voice support via a computerized branch exchange, will be provided under the SAA umbrella.

Taken together, communications support, programmer interfaces and a common user access will allow for the development of common applications that will operate under SAA on incompatible systems as if they were running on the same system. At first, IBM will focus on office applications for document creation, document storage, document transfer and decision support with secondary focus on industry-specific applications. With that accomplished, IBM will have effectively ended the debate about its wide variety of incompatible systems by simply eliminating the question.

Via SAA, IBM is attempting to create the same kind of applications portability now found primarily in the Digital Equipment Corp. VAX environment. But there is one key difference: SAA specifications have been developed to be part of an SNA network, with the host, as always, maintaining a key controlling function. Although some SAA-compatible products — IBM's OS/2, for example — will be able to operate in a stand-alone mode, and applications will be portable across systems, users will only be able to take full advantage of these products in an SNA-controlled environment.

When the architectures are fully implemented, corporate users will be less dependent on the host but more dependent on the functions of SNA and on products provided directly from IBM.

Products, services and applications based on the SAA guidelines will be implemented in phases, beginning with office-based applications such as Enhanced Connectivity Facilities, which is slated to be released in September.

Release plans for Microsoft Corp.'s MS OS/2 operating system for the IBM Personal System/2 typify how certain key products will be gradually moved under the SAA umbrella. IBM's OS/2 Standard Edition Version 1.0, due for release in early 1988, does not include support for SAA. IBM's OS/2 Standard Edition Version 1.1, which is likely to be available in the third quarter of 1988, will support the SAA presentation interface. It will not support any other SAA element.

OS/2 Extended Edition, likely to be released in the late 1988 to 1990 time frame, is a full implementation of SAA standards with support for Common User Access, Common Communications Support and the currently announced applications programmer interfaces.

A far more difficult task awaits software and systems developers planning SAA migration for existing products designed for older IBM environments. End users, MIS executives, third-party programmers and IBM will all benefit from SAA, but the benefits won't be realized without a cost.

Fleig is director of systems research specializing in local-area networking and IBM communications for International Technology Group in Los Altos, Calif.

BIT BLAST

Local Bell to run net trials

New England Telephone & Telegraph Co. recently announced that it would begin implementing Integrated Services Digital Network (ISDN) on a trial basis this summer. The network will support voice, text, data and video transmission over ISDN links and is part of an overall network modernization and construction plan for which the divested Bell operating company has budgeted $2 billion for the period between this year and 1989.

The plan calls for the company to more than double its current installation of digital and fiber-optic transmission facilities, a company spokesman said. New England Telephone has installed more than 50,000 miles of fiber-optic cable and approximately 100 digital switches so far.

Vitalink Communications Corp. has expanded the network management capabilities of its IEEE 802 wide-area network links between geographically separate Ethernet local-area networks. New software allows 802 wide-area networks to determine the most efficient routing paths between remote devices on a network, the vendor said. An 802 wide-area network can now put backup facilities into operation when it senses circuit breakdowns and network congestion. Vitalink also announced an optional 1.5M bit/sec. DS1 interface for its Translan bridges. Priced at $4,000 for existing Translan systems, it is a standard feature with Translan IV. The management software is available free of charge within 90 days as an upgrade, Vitalink said.

Integrated Telecom Corp. in Richardson, Texas, will resell SR Systems' X.25 packet-switching systems as optional add-ons to its Digital Access and Cross-Connect System family of T1 switches. The X.25 packet assembler-disassembler and X.25 Switch Modules cost between $1,100 and $5,000, depending on configuration.

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Leased lines

FROM PAGE 45

network performance.

• Data-Link Systems, Inc., a South Bend, Ind.-based service bureau that provides software packages for the integrated banking and mortgage banking communities, reports that it can now double the effective throughput of its 9.6K bit/sec. leased lines. When its customers outgrow an existing line, they install a multiplexer/compressor instead of an additional line. The average payback takes 10 months.

• Litton Computer Services uses a pair of multiplexer/data compressors to support one Harris Corp. printer at 14.4K bit/sec., another Harris printer at 19.2K bit/sec., a Tandem Computers, Inc. CPU at 7.2K bit/sec. and two IBM 3274 controllers and two IBM 3630 card readers at 9.6K bit/sec. — all over one 56K bit/sec. circuit. And Litton still has enough reserve bandwidth to double the existing load.

• Wang Financial Information Services Corp. used to get five 9.6K bit/sec. channels out of its 56K bit/sec. digital lines.

Statistical multiplexer/data compressor devices give the company 15 or more 9.6K bit/sec. channels out of those same lines. Wang expects to save "hundreds of thousands of dollars a year," says Gary Grant, network analyst for Wang Financial Services in New York.

Statistical multiplexers/data compressors — mux/compressors for short — are easy to install, won't disrupt your existing networks and work with any synchronous, bisynchronous or asynchronous protocol. They can be used on conventional analog circuits, high-speed digital circuits — even T1 links — and they are often much less expensive than additional leased lines. More importantly, mux/compressors can significantly reduce telecommunications costs by doubling, tripling or even quadrupling the throughput on your existing data communications circuits.

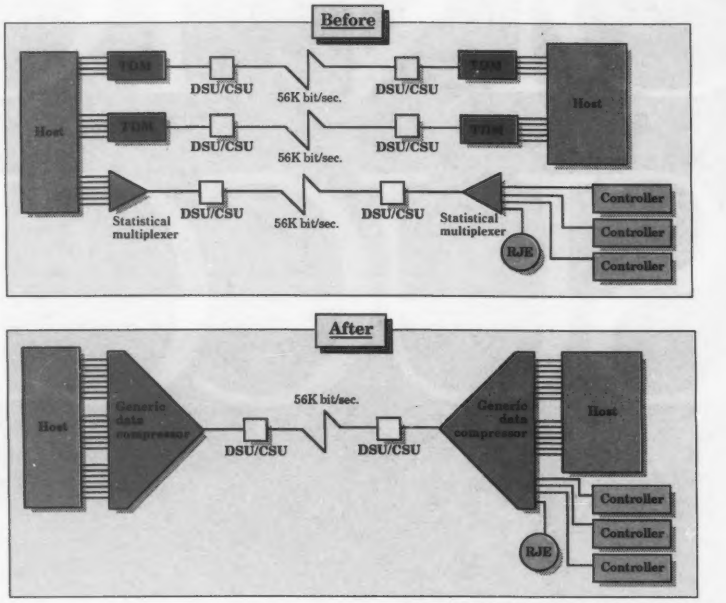
But what exactly are mux/compressors, and how do they do what they do? There are two elements to every mux/compressor:

• Statistical multiplexers combine the inputs from a number of sources into one composite output and increase the probability that the line will be carrying useful information at any given moment. This process is sometimes referred to as data concentration.

• Data compressors are based on the concept that if you can express the same data in fewer bits, you can transmit more data over an existing line. As long as the device on the other end decompresses the data back into its original form and you do not introduce too much delay in the transmission, the whole process is totally transparent to the protocol or network.

Sample data networks

Data compression eliminates multiple lines between sites, reducing leased-line costs



INFORMATION PROVIDED BY SYMPLEX COMMUNICATIONS CORP.
CW ILLUSTRATION: MITCHELL J. HAYES

To illustrate, a 100-character block of data typically requires 800 bits to communicate in either ASCII or EBCDIC code. Various data compression algorithms allow those same 100 characters to be communicated in 400 bits or less. So the 800 bits it took to communicate 100 characters in EBCDIC code could communicate 200 characters if the data is compressed. This 2-1 compression ratio would effectively double the throughput of any existing data communications line.

Low-delay multiplexers

Mux/compressors include low-delay multiplexers, which provide for increased flexibility. You can have an SNA network on one input, bisynchronous on another, Digital Equipment Corp. Decnet on a third and another multiplexer supporting a number of asynchronous terminals in the fourth input.

Each of these inputs will be transmitted reliably over the same high-speed line with a high data compression ratio and full end-to-end data checking on each channel for assured data integrity.

Mux/compressors have proven to be transparent to existing networks. They do not interfere with network protocols. The sending side compresses the entire data stream, including flow control and other protocol-specific characters. Error checking on the receiving side assures that the data stream has been decompressed back to its original form. Since there is no change in the data stream, the mux/compressors do not adversely affect your network's performance.

A mux/compressor device features intelligent multilevel adaptive data compression algorithms, which quickly adjust to the nature of the data being transmitted. You can send an English text file followed by a binary file followed by a Cobol listing followed by a data base transfer followed by a remote bootstrap — and count on the algorithm to adapt and maintain consistently high data compression ratios.

Earl Talen, communications manager for Data-Link, explains how multiplexing complements data compression in his applications. "We work with mortgage banking customers who utilize an IBM 3270 bisynchronous protocol environment. We have the computing facilities here in South Bend and the terminals are located at the customer's site," Talen says.

Increasing efficiency

"The data compression lets us get two 9.6K bit/sec. channels over one 9.6K bit/sec. leased line. Multiplexing lets us use that increased bandwidth more efficiently," he adds.

Talen tells of one customer who is running two interactive cluster controllers and a remote job entry station on a single leased line. He installed a Symplex Communications Corp. Datamizer mux/compressor, which — based on transmission activity and preset parameters — allocates the percentages of available bandwidth for each device.

"The customer is getting better response times than they would get if they had installed an additional line," Talen says. "By saving them the cost of an addi-

One on one: A backup comparison

While statistical multiplexing and data compression technology allows you to connect more devices to existing leased lines, that in turn can increase the potential impact of a leased-line failure.

Darlane Hoffman, technical manager of data communications at Metropolitan Life Insurance Co., had to verify the reliability of backup before installing mux/compressors extensively in Metropolitan Life's IBM Systems Network Architecture network. "One of the concerns of top management was that we would be tying two to three times more users to a single circuit. Failures on such heavily used lines could cause tremendous problems," Hoffman says.

Backup plans can help protect against leased-line failures. The principal mux/compressor vendors provide several options:

• Symplex Communications Corp. offers high-speed dual-autodial backup through the Quantum series of modems for its Datamizer mux/compressors. When the leased line is down, the Quantum modem automatically establishes two dial-up links that enable it to maintain high-speed communications. Symplex claims that the Quantum series can maintain effective speeds of up to 24K bit/sec. over two dial-up lines.

Metropolitan Life uses the dual-dial backup strategy. Hoffman says, "We found that there was virtually no degradation of performance in the dual-dial backup mode. So even when we have had circuit failures, we have been able to maintain operations without interruption."

• Datagram offers an alternative backup strategy through its DM-408 dual-link Steamer, which can be connected to two separate lines. The DM-408 Steamer has two independent multiplexer and data compression modules, each of which has its own internal bus, memory, data compression and I/O circuits.

During normal operations, the two modules share both the available lines through a special circuit that Datagram claims will "assure optimum use of each leased line and guarantee the best possible response time." If one of the leased lines fails, the DM-408 automatically reroutes the traffic through the other line. The network manager can set relative priorities to each of the input ports to minimize the impact of a circuit failure.

Russel Ramey, president of Comlogic, Inc., a communications consulting firm in Great Neck, N.Y., compares the Symplex and Datagram approaches. "The Symplex automatic dial-up capability is a good solution for domestic circuits, especially if a single leased line is sufficient for your needs. I prefer the Datagram solution for international lines," Ramey says. "International lines have a higher rate of failure, and there's no certainty that you will be able to establish two dial-up connections when you need them. The two-leased-line approach is cost-effective so long as you need the combined bandwidth of both lines during normal operations."

LEONARD A. HINDUS

tional line, their mux/compressors paid for themselves in less than a year. Mortgage bankers really appreciate that kind of payback."

If you are leasing more than one line between two points or nearing the capacity limit of an existing line, you should consider the economics of mux/compressors.

You will need a pair of mux/compressors for each line. Mux/compressors for lines up to 16.5K bit/sec. cost about $8,000 a pair. So if you replace a line costing $670 or more a month, the payback period will be less than a year.

Mux/compressors for a 56K or 64K bit/sec. digital circuit can cost $20,000 or more a pair. So if you pay less than $1,700 a month for each line, it may be more economical to add a second circuit. That is, of course, if you can wait until you can get another line installed.

"Both service issues and economics push us toward mux/compressors," Wang Financial Services' Grant says. "If the customer has outgrown the current lines, and you need to satsify his needs right away, you may have a problem. It will take a while to get a 56K bit/sec. line installed. It also takes a while to order, test and install the hardware to support that line. I can install a mux/compressor, which triples the data carrying capacity of an existing line, in just hours."

And tripling the throughput on a 56K bit/sec. line saves Wang Financial money. For the company, a line from New York to Los Angeles costs more than $5,000 a month. So if mux/compressors — which cost about $20,000 a pair — save the firm from having to install a second line, Grant says, "we realize an immediate savings of at least $40,000 in the first year alone."

T-1 or not T-1, that is the question

There is an enormous gap in the leased-line services currently offered by the common carriers. Right now, if you have more than 64K bit/sec. of data, T1 — at 1.54M bit/sec. — is your next step up. That is quite a gap.

Mux/compression technology fills the gap at a cost per bit that is cost-competitive with T1 service. For example, Datagram, Inc. claims to deliver an effective throughput of up to 168K bit/sec. with its Steamer mux/compressor line. Symplex claims that its new Datamizer II products increase throughput to 224K bit/sec. over a 56K bit/sec. circuit.

A typical 1,500-mile AT&T T1 circuit costs an average of $346,380 per year, not including installation charges. A 56K bit/sec. circuit of the same length costs $40,344 per year. If a pair of mux/compressors boosts the throughput of your 56K bit/sec. line to at least 168K bit/sec., then three 56K bit/sec. lines with mux/compressors will give you a total throughput of more than 500K bit/sec. at a cost of $121,032 a year. That's a savings of $225,348 a year. And even if you need a full 1M bit/sec. of capacity, you can still save $104,316 a year compared with T1 service.

Not only is data compression a cost-effective alternative to T1, but it is an investment you can carry over if you ever install a T1 link. Darlane Hoffman, technical manager of data communications for Metropolitan Life, tested mux/compressors on T1 channels. They functioned exactly as they had on leased lines.

Hindus is an author and principal of Ribbledale Communications, a marketing communications consulting firm based in Hudson, Mass.

Who's who in mux/compressors

The following are brief glances at the principal mux/compressor vendors:

Symplex Communications Corp. is located in Ann Arbor, Mich. Based on market share, Symplex is the leader in the arena; with 4,500 units in the field, the firm claims more of its Datamizers have been installed than all other mux/compressors combined.

Symplex says its new Datamizer II line will produce a typical data compression ratio of 4-1 or greater.

Datagram, Inc. in Boucherville, Que., also offers a full line of mux/compressors. Its Steamer products boast 2-1 to 3-1 data compression with a range of multiplexer and backup options. Datagram reports approximately 1,900 Steamer products installed.

Codex Corp. in Mansfield, Mass., has been offering data compression as an option on its high-end multiplexers for more than a decade.

However, the company has only recently dropped fixed tables in favor of adaptive compression, and it only offers adaptive compression on its 6700 series of products. The firm does not release market share information. Codex claims a 30% increase in throughput due to compression.

LEONARD A. HINDUS

Net managing

FROM PAGE 45

manager Julian Gottesman, a user from regional Bell holding company Nynex Corp., said that in his six-node network management scheme, it means keeping track of who is connected and fixing what is broken. He said management functions take up 5% of his time.

But Jack Russell, local-area network director of Martin Marietta Corp., said that at his company, "management is not associated with maintenance." Russell suggested gathering network management input from members and putting out a policy statement for people to criticize. "That will make people mad and get a reaction from other network users who need to get involved in helping us define network management needs," he said.

Some attendees expressed anger that their networking problems, management in particular, are not being addressed well by vendors.

"I have 14 [Digital Equipment Corp.] VAXs in a VAX center, an AT&T switch somewhere else with T1 concentrators, four Ethernets and a bunch of other stuff. If you could come up with a scheme to manage that whole thing, I would pay you a good amount — say 10% to 15% of network costs — to do it," Pappas said in a challenge to vendors.

But the vendors sounded just as confused as the users.

In answer to a user's question on how DEC planned to manage host-to-host communications, a DEC representative replied, "I assume you mean Digital host to Digital host." DEC's position, he then explained, is that it will interconnect and interoperate with other vendors to the extent that the other vendors support emerging standards.

While DEC's presentation focused briefly and clearly on present and future cabling and networking scheme plans, AT&T used dozens of complicated slides along with a rapid-fire presentation of its philosophy on everything from traditional voice networking services to future Integrated Services Digital Network systems. AT&T announced that network management functions such as network surveillance, customer control, billing and performance are hot topics today, but was unable to present a currently usable network management solution that addressed all of these areas.

AT&T spokesman Roy Weber came back at users with the suggestion that their companies might need to develop more coordinated strategies for managing their networks.

"Some people plan for the technology, broken into voice or data, some plan the cabling scheme, others pay attention to the costs," Weber stated. "There is not a total picture."

Bridging

FROM PAGE 45

also participate in the project. DEC has agreed to provide a Microvax II system and a complete suite of OSI protocols that work under the VAX/VMS operating system.

Network Research will provide its software products that implement the Defense Department's protocol suite under VMS.

The gateways and testing protocols will be accessible over OSInet, an international network system that was designed to be a test bed for products' compliance with and interoperability under OSI protocols.

The Defense Department plans to incorporate the gateways into the Defense Data Network to ensure that users will be able to communicate during the time when some systems have migrated to OSI, while others still use TCP/IP, Mills said.

The Defense Department's latest version of the Government OSI Procurement policy, released in late April, stated that "once the Federal Information Processing Standard [incorporating OSI specifications] is published, government agencies can continue buying non-OSI products for two years, but after that the specifications are mandatory" for all agency networking procurements, Mills said.

NEW PRODUCTS

Network management

Communications Sciences, Inc. has announced the **Telecom Manager**, a personal computer software package designed to automate telecommunications operations and order processing.

The Telecom Manager is said to supply instant support data to assist in the management of communications assets.

It consists of multiple interactive modules, including the equipment manager, private-line manager, trouble manager, cable manager, directory manager and bill manager. According to the vendor, the modules provide the necessary tools for managing voice and data equipment, inventories, cost controls and line and equipment troubles.

Prices for the Telecom Manager begin at $9,500.

Communications Sciences, 485 Rt. 1, Iselin, N.J. 08830.

Protocol converters

Case Communications, Inc. has introduced the **8110-A gateway** said to enable Apple Computer, Inc. Apple II and Macintosh computers as well as other asynchronous devices to access IBM host computers.

The 8110-A gateway provides protocol conversion and file transfer for up to eight asynchronous devices. It emulates an IBM 3274 cluster controller unit that links computers and printers to a bisynchronous IBM host or compatible computer. The gateway features a line-tracing function for diagnosing problems in connection lines and offers on-screen Help.

The 8110-A gateway is priced at $2,850.

Case Communications, 7200 Riverwood Drive, Columbia, Md. 21046.

Local Data, Inc. has provided enhanced printer and terminal capabilities on the **Interlynx/5251** protocol converter for connectivity to IBM System/34s, 36s and 38s.

The Interlynx/5251 now allows all currently supported ASCII printers, including Hewlett-Packard Co.'s Laserjet, to emulate an IBM 5219 printer. Also, simple asynchronous devices such as digital weight scales and coin counters can be attached through the computer interface driver on the Interlynx/5251.

The Interlynx/5251 is available in one- to seven-port models and is field-upgradable.

A single-port nonupgradable model costs $1,295. Upgradable models range from $1,450 to $4,750.

Local Data, 2771 Toledo St., Torrance, Calif. 90503.

Electronic mail

ITT Corp. has developed the **Officeaccess for DEC** software package, which is said to allow users of Digital Equipment Corp.'s VAX/VMS office systems to access the worldwide Telex network and other electronic mail systems.

Users of DEC's VMS Mail, All-In-1 and Mass-11 are said to be able to create; send and receive messages. The ITT service automatically performs all formatting, conversion and telecommunications functions.

The package uses an autodial modem, standard asynchronous port and telephone line. Prices for the software license are $1,850 for a stand-alone Microvax system and $2,750 for other VAX models.

ITT, 100 Plaza Drive, Secaucus, N.J. 07096.

Security

Dial-Guard, Inc. has announced its **Dial-Guard** in-line computer security product.

The Dial-Guard system is said to provide computer users' authentication and data protection. The system is composed of a hand-held Dial-Key, host resident software and devices attached to terminals or personal computers. It uses dynamic, one-time passwords and identi-

Continued on page 54

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fies users based on what they know, what they have and where they are.

Custom management and audit reports can be created, and interfaces to real-time message and electronic mail systems are provided. Optional message authentication coding and message encryption are available.

The basic system costs $250 per protected terminal or PC, plus a software interface site license.

Dial-Guard, Suite 140, Building 1, 3000 Sand Hill Road, Menlo Park, Calif. 94025.

Modems/ Multiplexers

Paradyne Corp. has announced its **3400 series** of network diagnostic modems.

The modems are said to incorporate the vendor's custom very large-scale integration circuit design with a digital signal processing architecture called the Universal Signal Processor (USP). Features include an integral two-channel, buffered time division multiplexer and network management diagnostics.

A trellis-coded modulation technique is said to allow the 3400 series modems to operate at speeds up to 19.2K bit/sec. with fallback to 9.6K bit/sec.

Prices start at $8,900.

Paradyne, 8550 Ulmerton Road, Largo, Fla. 33541.

Case Communications, Inc. has introduced the **7126 Time Division Multiplexer.**

The six-channel multiplexer is said to transmit data at speeds up to 56K bit/sec. over digital services such as AT&T's Digital Data Services. It acts as a transmission-line concentrator for both digital and analog modems and as a backbone for other multiplexers. The 7126 also supports voice channels, the vendor said. It is compatible with any synchronous application and is said to be transparent to protocols.

The 7126 costs $1,700.

Case Communications, 7200 Riverwood Drive, Columbia, Md. 21046.

Diagnostic equipment

Data Comm for Business, Inc. has announced its **PL 19.2 Plus** trellis-coded diagnostic modem.

The 19.2K bit/sec. synchronous modem was designed for use on four-wire point-to-point leased lines. It operates over some unconditioned leased lines. Fall-back rates of 16.8K, 14.4K, 12K and 9.6K bit/sec. are supported.

Users may perform diagnostic tests using an asynchronous terminal as a control console. Access can be either local through direct connection or remote through dial-up modems.

The modem costs $6,300.

Data Comm for Business, 807 Pioneer, Champaign, Ill. 61820.

Digilog, Inc. has announced **protocol analyzer** hardware and software for Integrated Services Digital Network (ISDN) LAP-D protocol decode and monitoring, testing, simulation and emulation.

The external interface adapter is for the basic rate that connects any Digilog protocol analyzer to the ISDN S or T interface. It allows protocol decode of user data on either of the two user B channels or testing of the Q.921 Level 2 or Q.931 Level 3 data on the D channel. The interface adapter connects directly to the ISDN interface.

The protocol analyzer products cost $1,000.

Digilog, 1370 Welsh Road, Montgomeryville, Pa. 18936.

Cabling

Lutzky-Baird Associates has announced the **LBA Repeater Box**, an amplifier device said to allow Apple Computer, Inc. Macintosh users to double the cable distance between Macintoshes linked by Apple's Appletalk local-area network.

One LBA Repeater Box connects the Macintoshes at the cable distance of 3,000 ft. Each additional LBA box adds about 1,500 ft.

The LBA Repeater Box with two Appletalk cables costs $249.

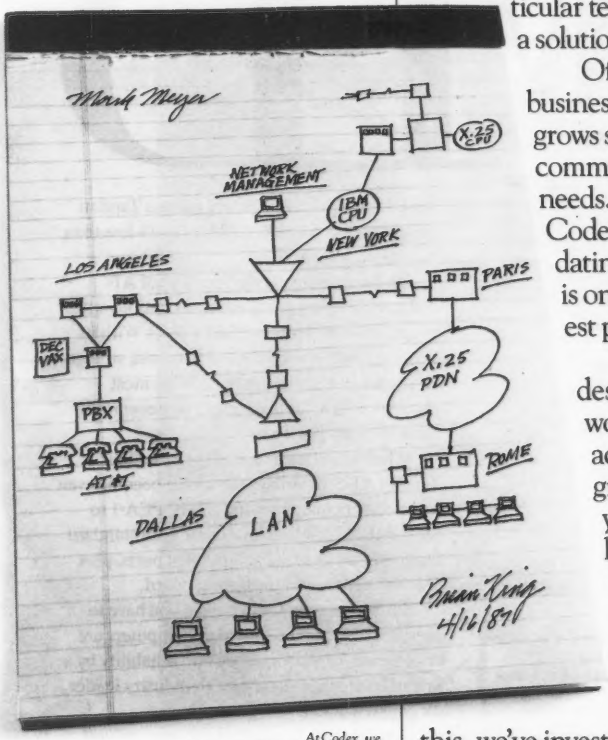
Lutzky-Baird Associates, #2011, 23801 Calabasas Road, Calabasas, Calif. 91302.

We're the largest independent networking company. Which is surprising since we've spent the past 25 years merging with AT&T, IBM and DEC.

For over 25 years, Codex has been dedicated to doing one thing well – providing networking solutions to meet any communications need.

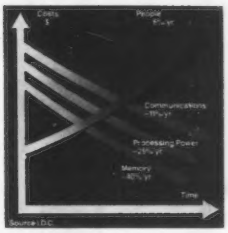
We're not a computer company. We're not a phone company. Data communications is, and always has been, our only business. So we can maximize the performance and functionality of all the pieces of your network, regardless of which vendors they come from.

As a result, our communications solutions are perfect for multi-vendor environments.



At Codex, we don't have set solutions – we work with your current environment. Which is why we spend a lot of time drawing diagrams like this.

And since our capabilities include everything from all types of transmission devices to gateways to network management systems, we're never trying to force fit a particular technology into a solution.



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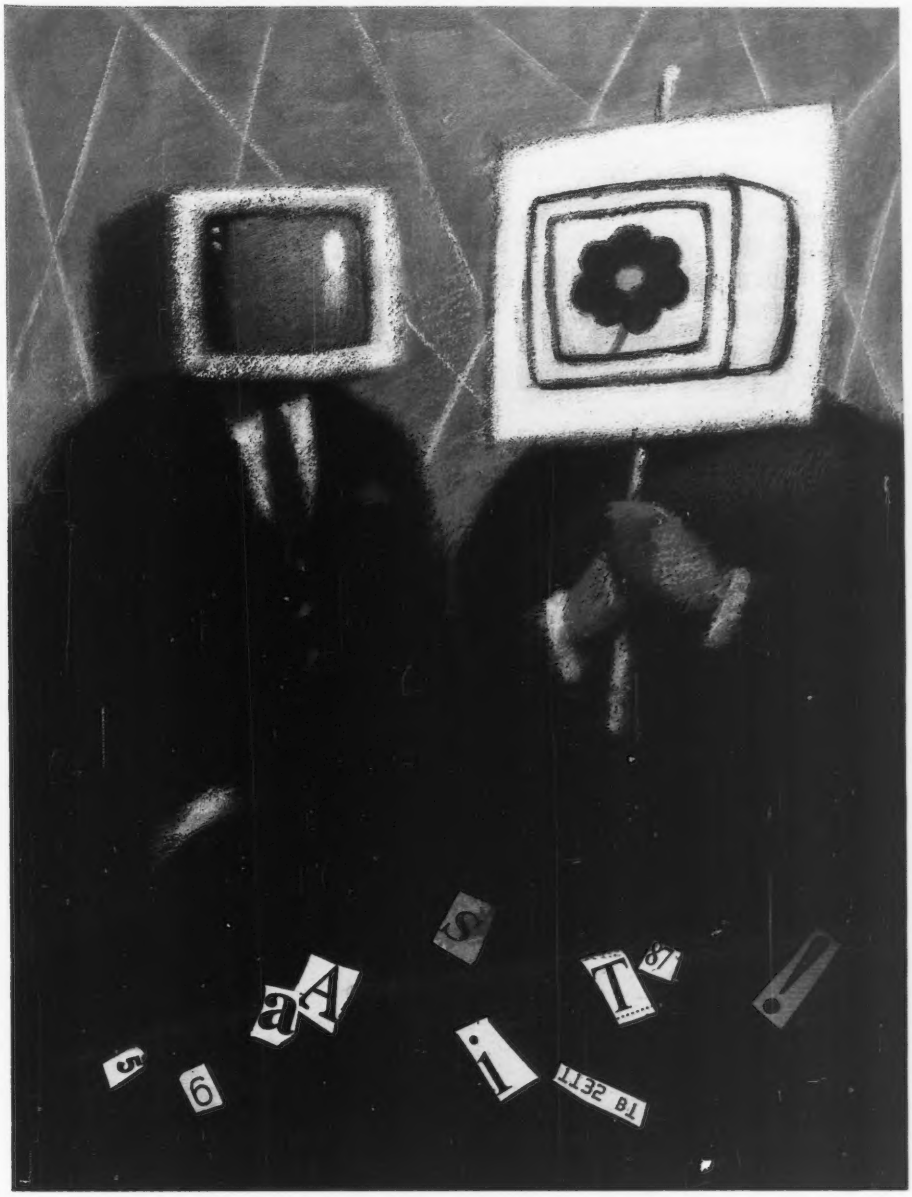
COMPUTERWORLD

SPOTLIGHT

PCs — IBM AND COMPATIBLES



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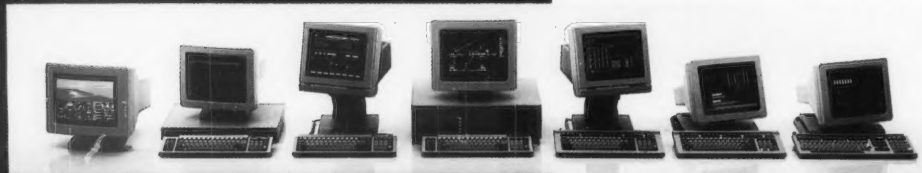

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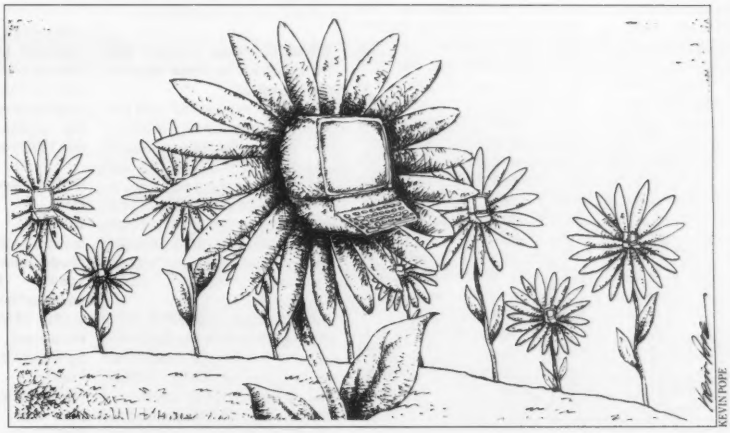
The field of PC compatibles and clones is due for winnowing. The hardiest varieties may find fertility in abandoned ground.

LINES SHIFT IN PC FIELD

BY JOHN XENAKIS



Cloning IBM's microcomputers has been a boom business for the past several years, and early indications are that, despite IBM's recent announcement of its Personal System/2, plenty of opportunities still exist both for those who have already staked out claims and for those ready to follow the leader into new terrain. That is not to say that there will not be losers. Some high rollers and many wildcatters are likely to be forced out of the competition, but the change will be more in the nature of a slow squeeze than a radical shakeout.

Right now, for most users and vendors of personal computer clones and compatibles, it is business as usual as everyone tries to figure out how the announcement of IBM's PS/2 family will affect them in the long run.

It appears the IBM announcement was most squarely aimed at the top tier of PC compatible vendors such as Compaq Computer Corp., AT&T, Hewlett-Packard Co. and ITT Corp. (see chart page S5). These are the vendors that try to provide uniquely engineered products from the ground up and that will sell into the corporate enviroment.

These companies are now treading on dangerously contested turf, according to Andy Seybold, chairman of the market research and consulting firm Seybold Group, Inc. in Torrance, Calif. "It's in the corporate environment that IBM has notified everyone that its new machine is what they need for connectivity."

The manufacturers at the top end of the PC compatible spectrum all have new PC designs on the drawing boards, and many of these designs may now have to be scrapped or heavily modified to take IBM's new machines into account. There is no question that a company announcing a product today based on the Intel Corp. 80386 chip would have to address the issue of compatibility with IBM's as-yet-unavailable PS/2 Model 80, which incorporates the 80386 chip. Design modifications might cost that company millions, but not to perform the modification would be to risk the label, "not-quite IBM compatible." Such a characterization spelled big trouble for the first clone makers in the early 1980s.

It is not surprising that the top-level vendors have been extremely closemouthed in reacting to the IBM announcement. AT&T, for example, will make no comment beyond a prepared statement that reads, "We understand what customers require — support of industry standards, connnectivity, open architecture and protection of customers' investment. To the extent that the products announced by IBM meet those requirements, we welcome them."

Not everyone is so reticent, however. Some high-end PC compatible makers are more than willing to discuss the opportunities they say IBM has introduced for them.

"From HP's perspective," says Jim Carlson, marketing manager for HP's Personal Computer Business Unit, "the battle is more technical because of large-scale integration and surface mounting [manufacturing techniques announced by IBM]. In fact, we welcome that, since we're

Xenakis is software editor of *Computer Update* magazine and president of Xenakis Consulting Services, Inc., a consulting firm and software house in Framingham, Mass.

Lines shift

FROM PREVIOUS PAGE

much more technically oriented than many of the other clone manufacturers. If a new announcement can create a new standard, that creates opportunities for us. We feel that will cause a shakeout of some of the other clone manufacturers, who don't have the in-house expertise to meet the technical demands of the new systems."

Carlson emphasizes that many factors influence users' choices of PCs. "The way IBM is approaching the marketplace is to attract people who want to buy from IBM and get their sales and support."

It is a fallacy, though, according to Carlson, that IBM has a lock on all the largest organizations. "Even in the Fortune 500," he says, "some will prefer not to buy from IBM. In fact, the Fortune 500 is very much a mixed-vendor environment — some HP oriented, some DEC oriented, some IBM oriented. What's important to these people is to connect all of these machines together."

> "THE Fortune 500 is very much a mixed-vendor environment."
>
> JIM CARLSON
> HEWLETT-PACKARD CO.

Tandy Corp. sees little to fear in the new IBM micros. "Tandy is the unsung hero of this marketplace," says Ed Juge, Tandy's director of market planning. "We've been the leader in sales of PC compatibles for over a year. Even with the public knowledge of an impending IBM announcement, our unit sales of PC compatibles were up 62% over the first quarter of last year."

An important part of Tandy's success lies in its dealer network — the Radio Shack Computer Stores. Many people are attracted to Tandy computers because of the readily available sales and support.

According to Juge, IBM's plans do not impact the part of the market in which Tandy is strongest. "Out of 100 Tandy machines sold, only four or five go to the type of company that IBM's announcement is addressing."

Safety in the middle

Technology is less important in the middle tier of PC vendors than it is at the top, although it plays a key supporting role. Vendors in the middle stratum compete on the basis of price/performance and make heavy use of standard technology. But they enhance their products with features — like a smaller footprint or an improved keyboard — that can be promoted in conjunction with price.

"Leading Edge's strategy has always been to take the current technology, improve upon it and make it more affordable for the vast majority of the marketplace," says John Sullivan, a vice-president at Leading Edge Hardware Products, Inc. in Canton, Mass. Sullivan points out that the company's first product included built-in IBM Enhanced Graphics Adapter boards and boards from Hercules Computer Technology, Inc. "Our goal is not to sell to the higher end, but to sell to all levels of the marketplace," Sullivan says.

One improvement that middle-tier PC vendors have been marketing is increased CPU speed. In fact, PC-compatible makers have been waging something of a megahertz war since the introduction of the IBM Personal Computer AT. The first IBM AT ran at 6 MHz (6 million basic operations per second), and recent versions of this product have been running at 8 MHz. Clone makers have been scrambling to claim 8, 10, 12 or even 16 MHz. Some even began marketing dual-speed CPUs, which provide a switch to slow down or speed up the CPU.

IBM's PS/2 announcement, which specifies CPU speeds from 8 MHz for the Model 30 to 20 MHz for the Model 80 (due to be released at the end of the year), will likely spur another volley of competition in this area.

However, since advanced technology is not the attraction at this level, middle-tier vendors are even less affected by the IBM announcement. In fact, Sullivan claims, IBM's recent moves will mean better distribution for Leading Edge. "IBM has definitely segmented the market with their new products and by requalifying and adding new qualifications to their dealer network," he says. "We're going to go after some of the dealers who have had to drop IBM since they can no longer meet its criteria."

Many mid-range PC compatible makers are, in fact, reacting to IBM's new direction as more an abdication than a challenge.

"IBM has really almost officially declared an abandonment of a certain section of the Fortune 2,000," says Marty Strayer, vice-president and general manager of sales and marketing at Epson America, Inc. in Torrance, Calif. "There are an awful lot of people with installed bases of MS-DOS-compatible equipment, including IBM machines, who have been abandoned by IBM," Strayer says. "And there's plenty there for us to direct our attention to. We're not disappointed by what's happened, we're enthused by it."

Larry Metz, executive vice-president at Packard Bell

Continued on next page

INTERVIEW
SURVEYING A RAPIDLY SHIFTING FIELD

At 22, Michael Dell is chairman and chief executive officer of PC's Limited, an Austin, Texas-based mail-order company he founded in 1984 after dropping out of a premed program at the University of Texas at Austin. PC's Limited manufactures its own complete line of personal computers that it sells directly to customers. Last year, the company's revenue totaled just more than $69 million. Dell recently spoke with Janet Mason about the PC compatible market in general and mail order in particular.

What do you expect the PC market to look like in six months?
I think the market will still primarily be purchasing products based on the Intel Corp. 80286 chip. The Intel 80386 chip will find its home in high-end applications and with lunatic-fringe buyers and buyers looking for speed. But the 286 is the most economical way to put power on the desktop today.

But you must expect a substantial market for 80386-based microprocessors, since you recently introduced one of your own.
I expect the 386 to be used in processor-intensive applications as file servers and engineering workstations. It's a very powerful processor engine, and there are a whole variety of uses for 386-based microcomputers that are compatible with Microsoft Corp.'s MS-DOS.

Which microprocessor is currently your biggest seller?
We are primarily selling the 286-based products. Sales are 8-to-1 in favor of the 286 technology. Most corporations are buying 286s, although the entry-level buyer, including individuals and small companies, does not typically buy the 286.

In the next six months, will the 8088-based PCs still have a place in the business market?
They'll have some place. Use of the Intel 8088 chip is certainly declining, but what we will see is a gradual fade-out as users look for more speed. The market is still application driven, and in word processing there are a whole variety of applications for a slow computer. I don't think IBM's announcement will really change whether people buy 8088-class machines.

What type of operating system will come with PC's Limited's 80386-based PC, and will it enable the machine to run multiple 8088 applications simultaneously?
We will sell MS-DOS Version 3.2 as an option, but it won't be standard with the machine. This operating system will not allow the 386 to run simultaneous 8088 applications. There are operating systems like that but we don't offer any at this time.

Will your line of 80386-based microprocessors be compatible with IBM's Personal System/2 line?
This is our own line of 386s, not clones of IBM's PS/2 line. These 80386-based PCs have a bus compatible with the Personal Computer XT and PC AT series from IBM. Our 386s will be compatible with IBM PS/2 to the degree that PS/2, XT and AT are compatible within themselves.

ALAN WITSCHONKE

Michael Dell

Do you think there will be a large generation of Personal System/2 clones?
I would expect that there would be a few. I don't have any opinions to express as to where these clones might be coming from.

What is the advantage of manufacturing and selling your own line directly?
It affords you advantages over the dealer/sales channel. The primary advantages are that the PCs come from one source, and the dealer's markup is not included in pricing. When you buy an IBM PC, you pay list price, which includes a dealer's markup of approximately 40% as well as IBM's gross profit percentage.

What will be happening on the PC price front in the next few months?
I don't think that our prices will fundamentally change much. As far as the industry goes, I think IBM will put some pressure on people that will spur price cuts. We've seen some of that already. There is nothing inherent in the 386 technology that will lend itself to lower costs, but the prices still may go down.

Will IBM's PS/2 line alter the add-on board market?
We don't sell add-on products for other people's products. We have a whole variety of products we sell that add on and into our computers, but we really don't participate in the add-on market per se.

The add-on market for IBM products consists of small and large companies including AST Research, Inc., Quadram Corp., Novell, Inc., Western Digital Corp., Sony Corp., and many other companies. The add-on market is changing because manufacturers are moving toward positioning computers with more standard features that add-on vendors might otherwise normally supply. For instance, the new IBM product has a video adapter and serial parallel port with every machine. All of the 286 products from IBM have a standard hard disk.

What kinds of customers purchase PCs through the mail?
Most of our customers are medium- and large-size businesses. But we also deal with the whole spectrum of the marketplace including individuals, small, medium and large businesses, government and education.

How will IBM's PS/2 introduction alter the mail-order business?
Only time will tell. There are a whole number of things that interplay in terms of reactions. It's evident that manufacturers that don't control their own technology could be in jeopardy, since they don't have the resources or the wherewithal to develop products that compete with IBM's new line. So that may influence the playing field a bit. •

Lines shift

FROM PREVIOUS PAGE

Electronics, Inc., agrees. "In the short term, our business is excellent," Metz says. "We've looked at all the IBM products and the new specifications, and we can't yet say how long it will take to come up with an equivalent or superior product.

"We feel that the Personal Computer XT marketplace — the lower portion of the marketplace — will still exist and that IBM has virtually abandoned it. When you get into connectivity to mainframes, that's where IBM wants to go, and they're not willing to sacrifice anything. But they've left the other area to us."

The vast majority of today's PC clone vendors are crowded into the low end of the market, in which fallout damage from IBM's actions is expected to be heaviest. It is almost a given that substantial casualties will fall on this bottom tier, where vendors generally use only established technology and compete almost entirely on the basis of price.

"Clone prices for PCs and ATs are going to fall through the floor, and that will affect the revenue stream for most companies, including Compaq and Tandy, but primarily those in the lower tier," Seybold says. "The pressure is on price. Sales won't slow down, but the perceived value of the product line is significantly less."

The types of operations run on this tier vary widely, however — ranging from large manufacturing firms to individuals assembling boxes in their garages — so the impact is not uniform.

John Rossi, president of Blue Chip Electronics, Inc. in Chandler, Ariz., says he is not losing any sleep. "There was a lot of hoopla about the IBM announcement — this business is full of a lot of nervous Nellies. All you have is the basic concept that the computer system has to be compatible with all the existing IBM PC software. That means there are some limits on how far IBM could go," he says.

Rossi is not disturbed by the image of low-end clones as hastily assembled, generic boxes. "Frankly speaking," he says, "I don't know what more you get from any of the other vendors, including ITT, AT&T and Compaq. They do have extra features, but when you boil it down, the users just want compatibility. If you look at companies like Leading Edge, Mitsubishi Corp. and so forth, for the vast majority of applications, they're all the same. The only real difference is the price."

The more things change . . .

Users are still evaluating the situation. The impact of the new technology on their operations probably will not be understood for several months. In fact, the most immediate beneficiaries of IBM's announcements may be consultants.

"My clients are asking how to plan their computer acquisition strategies in light of the new announcement," says Jacqueline Masloff, a Boston-based consultant and trainer. "They're afraid that if they buy now, they'll be locked into obsolete technologies."

Even so, one message is being heard loud and clear: Those who have bought IBM in the past will probably continue to buy IBM, and those who have bought compatibles or clones in the past will continue to do that.

"We've standardized on three computers: IBM, HP and Compaq," says Joseph Wedig, manager of computer services at Hercules, Inc. in Wilmington, Del. "We're impressed with the new IBM PS/2 announcement. We liked it, but we've got to evaluate it against our situation and look at it in terms of, 'What does it mean to us?' There's an issue of the new software on the IBM line. Will we move to the new operating system when it becomes available, or not? I don't know.

"At any rate, I expect that we'll stay with those same three computer vendors," Wedig continues. "It's a function of economics — we buy compatibles for improved price and performance."

> "FOR THE vast majority of applications, [vendors] are all the same. The only real difference is the price."
>
> JOHN ROSSI
> BLUE CHIP ELECTRONICS, INC.

City National Bank in Fort Smith, Ark., will follow any direction IBM takes, more because of its unique support requirements than any convictions about IBM's inherent technical superiority.

Mark Alexander, manager of microcomputer selection and support at City National, says, "Now we use mostly IBM. About two years ago, we bought eight Compaq portables, which is one of the best clones, and we've been very satisfied with those. But we also bought three Chameleon computers. Those caused us a problem, since it's hard to buy parts and support for them. Since then we've bought only IBMs."

Alexander attributes his choice of IBM to the fact that he is solely responsible for support. "We have 30 microcomputers here," he says, "and I'm the only one who manages them." Alexander says he plans to continue buying IBM exclusively, mainly because of support issues. "We want to have a standard box so that if someone calls with a problem, you know

exactly what hardware they're using.

"Some of the clones you can buy aren't exactly clones," he says. "You can't interchange parts. I've had lots of instances where a computer went down, and I've had the part to fix that computer just because it came out of an old computer, an old IBM."

Will IBM's announcements have an effect on Alexander's strategy? "We think the IBM announcement is very good, although it won't have a big effect on us for two to three years. At that point, it will be more important for a micro to communicate with the mainframe."

"The IBM announcement was old hat," says Patrick Marshall, director of MIS at National Medical Care, Inc. in Waltham, Mass. "I would rather have seen The Beach Boys — at least that would have excited me.

"It was a step backward, closing the architecture," Marshall says. "In fact, all the new stuff, like multitasking, is on the market right now. We've been using Concurrent DOS [from Digital Research, Inc.] for some time, and we have HP Vectras in place. I'm installing 100 PCs over the next year or two with Concurrent DOS. And we're going to be purchasing some ITT systems and hook up a couple of terminals to do some medical software."

> "THE IBM announcement was old hat. I would rather have seen The Beach Boys — at least that would have excited me."
>
> PATRICK MARSHALL
> NATIONAL MEDICAL CARE, INC.

Marshall says he feels IBM has a history of using hardware to lock in users. "I've seen some of my bosses get beaten up by being locked into the 370," he says, referring to IBM's mainframe system. "IBM tried to get you hooked on the 1401 in the '60s, and now they use other hardware to lock you in. People are getting leery of that, and because of that, IBM is locking out whole segments of the marketplace."

Marshall mentions specifically the Open Systems Interconnect (OSI) model for local-area networks developed by the International Standards Organization. "The military and government are forced to support all different kinds of software, and it's all on IBM," he says. "The OSI model gave them such promise for making things easier, and now IBM has abandoned it."

Marshall admits National Medical Care's priorities may differ from other companies'. "We're probably more bottom-line oriented, value oriented, more afraid of getting locked into a technology," he says. "With the machines I'm buying today, I'm saving tons of money. Two years from now, we'll be selling them to our employees for small change. My payback period is so short, I can't afford not to do this."

When a government agency purchases computers, it must observe certain laws governing the acquisition process. This mandate can lead to some interesting results.

"The reason we use compatibles over the IBMs has been the price/performance ratio they give us," says Daniel C. Lyons, manager of office automation at the New York City Department of Correction. "At the present time, we buy only NCR Corp. computers, and we have over 140 systems of the PC, XT and AT types.

"To arrive at a purchasing decision, we did fairly extensive benchmark testing, measuring the compatibility and performance of the different vendors' machines," Lyons continues. "In government, the procurement process involves bidding for an equipment contract, which means that the lowest bidder meeting the specifications is chosen. And since the specs were written against the IBM standard, NCR was the lowest bidder that met or exceeded all of these standards."

That is not an endorsement for NCR, Lyons adds. "In government, the lowest bidder makes the sale, as long as they meet the specifications. Maybe another machine that would have blown away everything else didn't get tested because its price was too high. It's a delicate line. This isn't like private industry where you can identify hardware that's the best in the market and buy it."

The Department of Human Services in Texas had to follow a similar process in its recent purchase of more than 3,000 Packard Bell AT clones. The computers will be networked to Unisys Corp. mainframes to provide on-line data base access for the administration of the state's welfare and food stamps program.

Al Marshall, administrator of the technical evaluation division of the Human Resources department, oversaw the evaluation process that chose the Packard Bell machines. "The decision on the Packard Bell was reached through the State of Texas competitive-bid process," he says. "We drew up a set of business and technical specifications, advertised them, evaluated them and made the award to the machine with the lowest price that met all of the specifications. The specifications in general required that the machine be equivalent to an IBM AT. We wanted the performance capability and the storage of the IBM machine. The specs were

Hierarchy of PC compatibles

Top tier

Research and development	Spends a lot on R&D to produce unique major products — new architecture and board design, new disk drives, new monitors
Technology	Tries to stay equal to, or ahead of, IBM
Customers	Fortune 500 companies
Brand loyalty	Very high
Market position	Disregards IBM, tries to develop own market strategy, often in conjunction with installed base of other products
Support	Has a comprehensive support program and is supported by numerous third-party support companies, as well as their own service force
Examples	Compaq Computer Corp., AT&T, ITT Corp., Hewlett-Packard Co., Tandy Corp.

Middle tier

Research and development	Takes advantage of generally available technology that is new since the last IBM announcement and spends just enough to add some additional features to come out with an improved product at a cheaper price
Technology	Six to 12 months behind IBM
Customers	Fortune 2,000 companies
Brand loyalty	Moderate
Market position	Bids aggressively against IBM and the high tier by pushing own price/performance advantages along with improved features
Support	Emphasizes support when asked, but it is not as strong as the high tier, and parts may be difficult to get
Examples	Leading Edge Software Products, Inc., Packard Bell

Bottom tier

Research and development	Spends R&D money on reverse engineering in order to make exact copies of existing machines
Technology	12 to 24 months behind IBM
Customers	Small business, homes
Brand loyalty	Low or none
Market position	Does not compete in the corporate community, but competes simply on the basis of compatibility and price
Support	Little or no support
Examples	Blue Chip Technologies

CW CHART

written for an IBM AT or functional equivalent. The Packard Bell machine met that set of requirements at the best price that was bid to us."

The presence of local support in the form of a value-added reseller also helped to clinch the deal, according to Packard Bell's Metz.

Local roots did not sway the department in another case, however. According to Marshall, Houston-based Compaq was ruled out on the basis of price. IBM was not even considered, he says, because it did not bid on the contract. As to how the announcement of the PS/2 might affect future plans, he says, "It's awfully early to try to assess how the IBM announcement will affect the future without being able to see the real impact of the operating system, OS/2. My opinion is that the IBM announcement has some significance not yet seen.

"I don't think they're going to destroy the marketplace for the AT-class machines that are out there," he continues, "because the relationship that I see right now is one that's somewhat analogous to the initial impact of the AT on the XT-type machines. The AT didn't wipe out that

Continued on page S10

Constructing a proper purchasing path

BY JANET MASON

Determining which personal computer to buy can be the least of a large organization's worries. After the decision is made comes a course of tricky hurdles posing questions such as: Which department does the purchasing? Where should the machines be bought? Who will maintain microcomputer strategies?

Mason is a Philadelphia-based free-lance journalist and communications consultant specializing in computer technology.

Responsibility for the acquisition of microcomputers most often rests with the purchasing department, MIS or both. While purchasing departments traditionally do not possess the technical expertise necessary to handle this task, that situation is changing in many companies.

Purchasing department employees are becoming more knowledgeable about PCs, according to Sojin Lim, purchasing manager at Gentech. Most of the people ordering computers from the New York-based computer retail and mail-order firm are purchasing managers. However, MIS still writes the specifications for microcomputer purchases, Lim says.

Division of power, although a common solution, is not always one that is achieved amicably. "In most large organizations, purchasing PCs is a political battle between the purchasing department and MIS," says Stuart Pastman, a consultant with The Matrix Organization, Inc., a Philadelphia consulting firm.

Even if the purchasing department wins the battle for paperwork control, Pastman says he believes MIS should retain ultimate control of selection. "Any organization that does not have MIS directly handling selection or at least giving its stamp of approval must be wasting a fair amount of money," he contends.

Antonia Bianca, manager of office technology at Pfizer Pharmaceuticals, Inc. in New York, handles purchasing through her department, a large PC-intensive information center. She says this is done not so much to obtain volume discounts but to maintain a unified PC strategy and assist users.

Pfizer buys its micros from dealers to obtain on-site service. When you buy directly from a manufacturer, Bianca says, "you only get a bunch of boxes on the loading dock." As a result, many companies, such as Pfizer, that do not have their own technicians, opt to use value-added resellers instead of other channels.

Selecting the source

Companies usually purchase PCs from one of three sources: the manufacturer's sales representatives, computer retailers or mail-order firms. To some extent, the choice is a function of company size. "Big shops can purchase directly from the vendor and get incredible discounts," Pastman says. Retailers, on the other hand, while they usually cannot handle orders in the thousands, can often offer better deals on purchases of 100 to 200 personal computers a year.

Whether the buyer turns to mail order depends on the criticality of his need, according to Pastman. Few companies buy PCs through the mail because too much can go wrong. Deliveries usually take longer than they would through a local dealer, he explains, and there is a higher probability of defects. "Mail order may have a 10% to 20% dead-on-arrival rate," Pastman says.

When boxes aren't enough

Bernie Whalen, executive vice-president of the ABCD: Microcomputer Industry Association in Chicago, says computer stores are now focusing on selling solutions — systems and information — instead of boxes. "Not too many computer stores are making money by having their salespersons hang around and wait for customers to come in," he says.

That approach might have worked if expectations of a large home computer market had materialized, according to Whalen. But because that hoped-for bonanza never became a reality, "the need for a storefront to sell PCs like other appliances just disappeared," Whalen says.

Instead, computer stores are developing expertise in specialized markets such as desktop publishing, government, medical and computer-aided design. Paul Robinson, a salesman with CPL, owner of Entre Computer Centers in the Delaware Valley, found, for example, a lucrative niche as a publishing analyst, selling electronic publishing systems to corporations. He is also developing markets among printers and in-plant print shops.

When dealing with the customer, Robinson speaks directly with the manager of the printing department and addresses the technology from the total business perspective. Robinson observes that the move toward selling systems and solutions puts purchasing directly into the business user's hands. And that, he says, is where it really belongs. •

Choosing a PC boils down to matching chips with needs

The generation gap is not just an issue for family counselors anymore. Microcomputers have now been around long enough to create their own intergenerational competition. The challenge is to match the right level of chip — the Intel Corp. 8088, 8086, 80286 or 80386 — with the appropriate applications for the most cost-effective blend.

The nature of microcomputing is changing from personal computing to corporate computing on microcomputers, says Stuart Pastman, computer consultant for The Matrix Organization, Inc., a Philadelphia-based consulting firm. "It is not unusual to find a multibillion dollar company that does financial modeling and its corporate budget on a PC," he says.

This type of application would require at least an IBM Personal Computer AT-class microprocessor and, depending on the extent of the data base, may even call for the more powerful generation of computer based on the 80386 chip.

Is the 8088 a dinosaur?

As a result of the need for more powerful microcomputers, the 8088-based microprocessor has become virtually extinct, according to Pastman, who adds that, among his clients, only those operating on very tight budgets are still purchasing them.

According to computer industry analyst and consultant Sandy Weinberg, however, the shift away from the 8088 chip may have at least as much to do with the profit motive as with the technology. Weinberg, founder of Weinberg Associates, Inc. in Glen Mills, Pa., says the advanced generations will be emphasized because they provide computer manufacturers and resellers with wider profit margins than the 8088. The 8088, he adds, is technically a fine chip that remains adequate for many applications.

The strength of the 80386 generation, Weinberg says, lies in large data base applications. The 80386 generation does not improve on such applications as spreadsheets, word processing and financial applications, he maintains. For this reason, Weinberg says, he recently advised three of his Fortune 500 clients to stay with their existing base of 8088 and 80286 PCs for most applications and to purchase 80386-based machines only for heavy data base applications that involve a substantial amount of search time.

Of the installed base of 500 PCs that Antonia Bianca manages at Pfizer Pharmaceuticals, Inc. in New York, 100 to 200 of them are 8088-based. Bianca, manager of office technology, purchased these when the 8088s were first introduced.

With the introduction of the 80286 generation, the company switched to the AT-class machines, which now make up the bulk of its PCs. Bianca does not plan to purchase any more 8088s.

The primary advantages of the AT-class machine are increased speed and storage, according to Bianca. Nearly all Pfizer's employees have their own PCs and are sophisticated users. The 80286-based machines are used for spreadsheets and for downloading financial systems from the mainframe to the PC. Bianca expects the AT-class machine will continue to be her company's standard, with about 10% of the installed base eventually migrating to the 80386. If the company switches to IBM's Personal System/2, "we will probably go with the Model 60 286 with the 44M-byte hard disk," she says.

Speed and power are not the only advantages of the 286 and 386 architectures, according to Pastman. The new operating system being developed to allow multitasking, he says, will not run on the 8088-based machine. "The operating system is not here yet, but companies that invest in the advanced chip generations are buying a future," he says. When software is developed to run on the advanced operating system, he adds, the 8088 will be out of the running.

Executives and power users

Pfizer has "a handful" of 80386-based microcomputers, according to Bianca, which it uses for data base-intensive applications. Since the operating system that would tap the full potential of the machine is not yet available, she says, the only immediate advantage of this generation is the 130M-byte hard disk drive.

In his consulting work, Pastman says, he has seen two types of 80386 users. One, he says, is the corporate executive who wants the best and the fastest — even if it is only to do word processing. The other is the power user with a legitimate business need. Pastman explains that data base applications, huge spreadsheets and corporate modeling, which can take half an hour on the AT-class machine, may take only 10 minutes on an 80386 machine.

While the new generation of microcomputers requires additional investments for most companies, Pastman contends that the faster microprocessors will pay for themselves in salary dollars. "These systems are not a luxury," he says. "They are a cost-efficient way for corporations to operate."

JANET MASON

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IBM AND COMPATIBLES

VENDOR VIEWPOINT

All clones are not created exactly compatible

BY PAUL MAHONEY

Clones. Compatibles. What is the difference? The terms are often used interchangeably, but many points of difference exist between the two camps, points that become even more distinct in light of IBM's recent introduction of the Personal System/2 family.

The disparity between the two categories starts with the sourcing and engineering of their respective components, which, in turn, impact other characteristics.

The ready availability of stock parts — chips, boards, power supplies, drives — makes it easy for anyone with some electronics or technical capability to build a clone.

These are the opportunities on which garage industries readily thrive, and they are thriving in Korea and Taiwan. Too often, however, the components used by these foreign clone makers are the seconds rejected by the PC compatible manufacturers.

Unreliable sources of components complicate quality control. If the builder cannot get enough processors or boards from one supplier, he will get the rest from various other sources and possibly be forced to use lower quality chips. This inconsistent quality leaves compatibility questionable.

Compatibles, on the other hand, are constructed from components that are designed by the manufacturer's own engineering staffs and built, primarily in the U.S. and Japan, to the manufacturer's own specifications. Furthermore, PC compatible makers generally possess greater resources for systematic quality control.

Documentation and support are also important points of differentiation. Because they possess more substantial resources, PC compatible manufacturers are able to provide users more comprehensive documentation to accompany their systems and can offer support through dealers or toll-free hot lines. These compatible manufacturers may offer warranties and usually provide an entire family of computers, which gives users several options to meet their needs.

Clones, however, hold some advantages over compatibles. Manufacturers of these systems seek targeted market exposure by providing high-value features. And, since their organizations are smaller than those of PC compatible manufacturers, clone manufacturers can migrate

Continued on next page

Mahoney is vice-president of sales and marketing at Victor Technologies, Inc. in Scotts Valley, Calif.

Lines shift

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marketplace. I don't think the new machines will wipe out the marketplace for the AT 286 machines, since those are pretty husky workhorses. The new machines are going to fill some niches and open up some opportunities, but I think the operating system software is going to have as much of an impact on the machine itself."

Postponing imitations

"With its PS/2 announcement, IBM bought itself nine months before it'll be in trouble with a clone," Seybold predicts. "It will take Taiwan or Korea about six months to reverse-engineer the new systems in order to copy them, and then there'll be a copyright infringement suit that'll take three months."

As an indication of things to come, Seybold suggests, "Take IBM's OS/2 brochure and count the number of times that the IBM copyright notice, or something like that, appears. That's going to be a key to how long it will take the clone makers to copy the new systems. You should assume that IBM is going to take a strong legal posture. They're not going to win with that in the long run, but they'll use it to stall and use it as a delaying tactic."

However, according to George F. Colony, president of Forrester Research, Inc. in Cambridge, Mass., the clone makers' problem lies much more in technological terms than legal ones. "IBM has essentially said that if you want to play in this game, you're going to have to make a sizable investment," he says. "In fact, there will be a much more sizable technology investment for anyone who wants to get into the clone business for the new systems. This means that companies like Compaq and Tandy will be all right, but the new technology will knock out the

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All clones

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quickly to new technologies.

It is also true that clones enjoy a price advantage. Low overhead in engineering, design and support and less costly parts and construction mean lower prices — prices that compatibles cannot match.

Competition, then, is based on features and price for clones; for compatibles, it is based on quality, reliability, compatibility, documentation and support. For buyers and users, it becomes a question of value.

You can spend less for a clone but risk buying an unreliable machine, one that may not run popular business programs such as Lotus Development Corp.'s 1-2-3. You may get a lot of features, but you may not get documentation to help you run the machine, or if something goes wrong, there may be no one to call.

Some good clones out there may be exceptions to these generalities, but it is safe to say that finding them is a little like throwing dice.

In anticipating IBM's announcement of its new products, the industry generally conjectured that the PC giant was out to steamroller the clones and compatibles. Although the announcement will certainly affect manufacturers of both types of systems, IBM has clearly abandoned the low-end of the market (small business users and professional home users), leaving it to the clones and compatibles.

SMALLER companies will be forced out of the mainstream computer market, and clones that are developed through reverse engineering will be out of business.

IBM has raised the stakes for clone manufacturers. Its advanced patented features, such as the 32-bit Micro Channel system bus and custom logic chips, cannot be duplicated exactly. As custom integrated circuits become the rule, fewer off-the-shelf parts will be used, and Taiwan garage operations will have a much tougher time.

The differences between compatibles and clones will become more and more pronounced, and only companies with the engineering expertise to design custom parts will survive. Smaller companies will be forced out of the mainstream computer market, and the clones developed through reverse engineering will be out of business.

PC compatible manufacturers also have a tough battle ahead of them, though, as they struggle to bring down prices and still provide high-quality machines with the features sophisticated end users demand.

Some PC compatible manufacturers have already lowered prices to coincide with IBM's price drops on the Personal Computer ATs and PC XTs, thereby decreasing the price advantage that clones wield over compatibles but also lowering their own profit margins.

IBM can afford this kind of sacrifice. However, some of the smaller PC compatible manufacturers will not be able to, and those without solid financial backing could be squeezed right out of the market. •

Lines shift

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garage clone makers."

There is no question about it: The new technology and corresponding legal problems provide an impressive array of new barriers that a would-be clone vendor of the new IBM systems will have to overcome. Jeff Bobzin, director of development for compatibility software at Phoenix Technologies Ltd. in Norwood, Mass., lists several of those barriers:

- Legal problems. "There's uncertainty about the legal ramifications of the new systems," Bobzin says. "There are still copyrights, and now there are patents, and, given the delay in the patent process, it will remain unknown for some time."
- The Video Graphics Array graphics chip, which is proprietary to IBM.
- The new bus, the Micro Channel, also proprietary to IBM. "This is something of a concern to the OEMs," Bobzin says, "since there's a whole line of new cards that have to work in that channel."
- The double-size read-only memory (ROM) BIOS, for which clone makers must provide duplicate functionality.
- New manufacturing technologies, surface-mounting, packaging that requires a great deal of increased up-front investment in manufacturing equipment.
- The operating system, parts of which IBM is now developing in-house, which will not be available to clone makers.

These barriers will mean it will cost a clone manufacturer much more than in the past to enter this new marketplace.

Getting down to BIOS

Bobzin is the manager responsible for the development of the clone ROM BIOS at Phoenix. Phoenix has developed a reputation for duplicating IBM's BIOS in a legal manner, and, so far, IBM has not challenged the company in any way. "We've

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ASK THE VENDOR

The following questions were solicited from users and conveyed to the vendors for responses.

Why didn't Compaq alert users prior to discontinuing support for IBM PC-DOS 3.2? How does Compaq intend to resolve the recently discovered problem with the Intel Corp. 80386 chip used in the Deskpro 386? Also, when will we see an operating system for the 386 that will encompass multitasking and multiuser capabilities?

Arthur Beil
Head of information center
Department of Agriculture's
National Agricultural Statistics Service

COMPAQ COMPUTER CORP.: Before Compaq introduced its MS-DOS Release 3.0 Version 3.2 on Feb. 17 with the announcement of the Compaq Portable III, diskettes supporting Compaq hardware using PC-DOS 3.2 were included in the operations guides of our hardware products. We felt this was necessary because of the IBM Token-Ring support PC-DOS 3.2 offered.

Compaq's MS-DOS Version 3.2 now offers that capability. If a Compaq end user still requires support for PC-DOS 3.2, his authorized Compaq dealer can obtain such support through Compaq's service department.

Compaq learned on April 8 that Intel had identified a production problem in the manufacturing of the 80386 microprocessor. This will result in a limited percentage of 80386 microprocessors encountering difficulty when running a 32-bit math function. There is no immediate impact on current Deskpro 386 users, since today's software is designed for 8- or 16-bit operations.

The Deskpro 386 comes with a one-year warranty, and Compaq is still working out the details of a program to address this issue before 32-bit software becomes available and well before the warranty period expires for the first Deskpro 386 purchasers. For a status report on this program, users can call this number: (800) 847-5785.

And, finally, the unique capabilities of the 80386 microprocessor will be provided through extensions to MS-DOS Release 3 this year. These will take advantage of the virtual mode of the 80386, which enables users to run current industry-standard programs concurrently.

IBM's OS/2, which will become available in 1988, will provide protected-mode multitasking for 80286- and 80386-based personal computers. Compaq will supply this to customers through Microsoft Corp.'s OS/2, which is compatible with IBM's standard version of OS/2.

SCO Xenix V/386 from the Santa Cruz Operation (SCO), a multiuser, multitasking operating system based on Unix System V, Release 3 from AT&T, will be available this summer. Compaq has worked closely with SCO to ensure this product will support all the hardware configurations of its 80286- and 80386-based personal computers.

When will an internal modem be available for the IBM Personal System/2 Micro Channel, and is the new Pageprinter, announced last month, only supported for desktop publishing?

Julian Horwich
Executive director
Chicago Association
of Micro Professionals

IBM: An internal modem is available. The IBM PS/2 300/1200 Internal Modem/A provides the capability to transmit data in duplex mode at 300 or 1,200 bit/sec. and supports the Personal Computer AT command set. It is compatible with the Bell 212A and 103 practice (asynchronous only) recommendations for transmitting data over the public switched telephone networks.

The Pageprinter can be purchased separately, but it must be connected to IBM's Personal Pageprinter Adapter Card, which has the necessary intelligence to drive the printer.

It also requires the desktop publishing software or other program instruction to make it work.

We are interested in creating a training videotape for users of our on-line information service. Is there a way to connect a VCR to the audio/video output on the Tandy 1000 in order to create a videotape of the on-line interaction occurring on the monitor?

Dr. John Sandness
Rural Physicians Associates Program
University of Minnesota
Minneapolis

TANDY CORP.: According to Radio Shack's Computer Product Engineering Department, this can be done by plugging the VCR into the composite video port on the Tandy 1000. Depending on the VCR used, a cable adapter may be needed to accommodate the RCA Corp. jack used on the Tandy 1000. All stopping and starting of the VCR must be done manually, since the Tandy 1000 is not able to control these functions.

Additionally, the user should hit the F2

key during boot-up or enter MODE TV at the MS-DOS prompt. This will put the computer in the 40-col., 200-line mode. If you are using a graphics software package, the software also needs to be set for 320- by 200-pixels to accommodate the television display.

Finally, the color-burst signal should be turned on. This is usually done through the software. If the user gets a color picture, then there is no need to change the color-burst setting. All these changes should be done prior to recording.

When will Hewlett-Packard's Vectra be able to boot from an internal 3½-in. drive so that users no longer require a 5¼-in. disk?

Robert Tivey
Director of information systems
Cadwalader, Whikersham & Taft
New York

HEWLETT-PACKARD CO.: The ability to boot from a 3½-in. disk is a very recent development. If there is a market demand to provide this technology, we will certainly evaluate how best to implement 3½-in. disks on our Vectra product line and make that available to our customers. However, at this time, we cannot say specifically when that capability will be available. In the meantime, we do offer data exchange capability between the HP Vectra and the HP Touchscreen, which has 3½-in. disk drives.

What can users expect from AT&T in terms of a processor based on Intel Corp.'s 80386 chip and 3½-in. disk media? Does the company plan to provide a graphics interface to Microsoft Corp.'s MS OS/2? Further, what role will Unix play, and does AT&T plan to continue support for Microsoft's MS-DOS?

Joel Hartman
Assistant provost for information technologies and resources
Bradley University
Peoria, Ill.

AT&T: Customers can expect AT&T to support current and emerging industry standards with state-of-the-art computer hardware, software and networking products. Recently announced AT&T products, such as the AT&T PC 6310, an IBM Personal Computer AT compatible, illustrate this commitment. Other products AT&T will announce this year will also offer strong alternatives to customers seeking standards, compatibility, connectivity, networking and investment protection.

Unix System V will continue to play a key role in AT&T's product offerings. AT&T recently signed an agreement with Microsoft that essentially establishes Unix System V as the standard operating environment for Intel Corp.'s 80386 microprocessor. And AT&T's newest departmental processor, the AT&T Model 3B2/600, is fast becoming one of AT&T's most popular products. The 3B2 is based on Unix System V.

The benefits of smaller and more portable systems are somewhat offset by a decrease in the number of expansion slots that are available for customizing applications.

Where does Compaq stand on this issue, and what is Compaq's position regarding providing IBM Micro Channel compatibility for its machine that is based on Intel Corp.'s 80386?

Stuart Cox
Project engineer
Kentucky Fried Chicken Corp.
Louisville, Ky.

COMPAQ COMPUTER CORP.: Compaq's newest and smallest personal computer, the Compaq Portable III, comes standard with a parallel interface, a serial interface and a red-green-blue color monitor interface. It can internally incorporate such features as memory (up to 6.6M bytes) and communications (an internal modem is an option) that often take up expansion slots. This computer also offers two full-size 16-bit expansion slots with the addition of the optional Expansion Unit that snaps onto the back of the unit. In designing the Portable III, we feel we have provided the required level of functionality yet kept the size of the system as small as possible. We have not yet introduced a laptop because the functionality compromises that must be made with current technology do not meet the needs of the majority of serious business users.

The Micro Channel expansion bus that IBM introduced with its Personal System/2 will not accept existing plug-in boards, including modems, various local-area network boards and high-resolution display controllers. IBM is today the sole supplier of Personal Computer peripherals to customers who go with the new IBM products. The bus offers 32-bit capability in the 386-based IBM machines, but this feature will not be useful for the foreseeable future. In fact, its advanced display capability is an 8-bit architecture. None of the other peripherals IBM announced use the 32-bit capability either. The industry-standard 16-bit bus will continue to meet the broadest set of needs in the PC market.

Where 32-bit power is needed is in the memory bus of 386-based machines. A 32-bit memory bus is a critical ingredient to the performance of the Deskpro 386. Up to 10M bytes of random-access memory are accessible through the 32-bit bus. The larger bus can rapidly transfer information to and from the 80386 microprocessor and does not place any artificial constraints on the microprocessor. This performance-matching allows for optimum system performance. •

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Acer Technologies, Inc.. (408) 922-0333	Acer 910	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	6	—	—	16.15 x 15.76 x 5.9	From $1,895
	Acer 1100	80386	MS-DOS	2M bytes	360K bits-1.2M bytes	40M-130M bytes	4.77, 6, 8, 10, 12, 16 selectable	8	2	1	21.0 x 17.0 x 6.5	Contact vendor
Advanced Computer Products, Inc. (714) 558-8822	Advantage-Sharp 7501	80286	MS-DOS	512K bits-1M byte	1.2M bytes	User-defined	6, 8 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,299
Advanced Logic Research (714) 581-6770	PC2/AT	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	NA	8, 10 selectable	5	1	1	21.3 x 17.3 x 6.8	$1,545
	Dart 012	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	NA	12	8	1	1	21.3 x 17.3 x 6.8	$1,595
	A Fast 286	80286	MS-DOS 3.2	512K bits-2M bytes	1.2M bytes	NA	8	8	1	1	21.3 x 17.3 x 6.8	$1,495
	A Dart Basic	80286	MS-DOS 3.2	512K bits-2M bytes	1.2M bytes	NA	10	8	1	1	21.3 x 17.3 x 6.8	$1,595
	Access 386	80386	MS-DOS 3.2	1M byte	1.2M bytes	40M bytes	16	8	2	2	21.3 x 17.3 x 6.8	$5,699
Afton Computer, Inc. (714) 553-1611	286 Turbo	80286	MS-DOS 3.1	512K bits-1M byte	1.2M bytes	0-115M bytes	8, 10 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,276
	Advantage 386 Compatible	80386	MS-DOS 3.2	512K bits	1.2M bytes	0-115M bytes	16	8	0	0	21.3 x 17.3 x 6.8	$3,295
Alphanumeric International, Inc. (213) 921-8689	ANI PC-AT	80286	MS-DOS	640K bits	360K bits-1.2M bytes	20M-130M bytes	8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,349
American Computer & Peripheral, Inc. (714) 545-2004	American 286-A	80286	—	512K bits	1.6M bytes	NA	6, 8 selectable	8	0	0	21.3 x 17.3 x 6.8	$1,995
American Micro Technology (714) 731-6800	AMT 286	80286	MS-DOS	640K bits	User-defined	User-defined	6, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	$699
	AMT-386	80386	MS-DOS	512K bits-4M bytes	User-defined	User-defined	16	8	0	0	21.3 x 17.3 x 6.8	From $2,499
American Research Corp. (800) 423-3877	ARC 286 Turbo Model 12	80286	ARC MS-DOS 3.2	360K bits-1.2M bytes	1.2M bytes	20M-50M bytes	6.25	8	0	0	21.3 x 17.3 x 6.8	$1,925
	ARC-386	80386	ARC MS-DOS 3.2	512K bits	1.2M bytes	40M bytes	16	8	1	1	21.3 x 17.3 x 6.8	$5,159
Apparat, Inc. (303) 799-0819	Apparat 80	80286	MS-DOS	640K bits	1.2M bytes	30M bytes	8	8	1	2	21.3 x 17.3 x 6.8	$2,603
Artificial Technology (415) 490-9344	AT-System	80286	MS-DOS 3.2, GW-Basic	256K bits	1.2M bytes	20M-40M bytes	10	8	2	1	21.3 x 17.3 x 6.8	$75
AST Research, Inc. (714) 863-1333	AST Premium-286 Model 80	80286	MS-DOS 3.1	512K bits	1.2M bytes	20M bytes	6, 8, 10 selectable	7	1	1	19.25 x 16.5 x 6.25	$1,995
	AST Premium-286 Model 90	80286	MS-DOS 3.1	1M byte	1.2M bytes	NA	6, 8, 10 selectable	7	1	1	19.25 x 16.5 x 6.25	$2,495
	AST Premium-286 Model 120	80286	MS-DOS 3.1	1M byte	1.2M bytes	20M bytes	6, 8, 10 selectable	7	1	1	19.25 x 16.5 x 6.25	$2,995
	AST Premium-286 Model 140	80286	MS-DOS 3.1	1M byte	1.2M bytes	40M bytes	6, 8, 10 selectable	7	1	1	19.25 x 16.5 x 6.25	$3,495
	AST Premium-286 Model 170	80286	MS-DOS 3.1	1M byte	1.2M bytes	70M bytes	6, 8, 10 selectable	7	1	1	19.25 x 16.5 x 6.25	$3,995
Atronics International Systems, Inc. (408) 942-3344	ATI 6/12-1 Wait	80286	MS-DOS 3.2	1M byte	1.2M bytes	NA	12	8	0	0	21.3 x 17.3 x 6.8	$2,395
	ATI 6/8-1 Wait	80286	MS-DOS 3.1	640K bits	1.2M bytes	NA	6, 8 selectable	8	0	0	21.3 x 17.3 x 6.8	$1,575
AT&T Information Systems (201) 898-1333	PC 6300 Plus	80286	MS-DOS 3.1, Unix System V, Release 2.0	512K bits	360K bits-1.2M bytes	20M bytes	6	7	1	1	21.3 x 17.3 x 6.8	$2,340
Baby Blue Computer Systems, Inc. (415) 636-1401	Baby Blue 16	8088-2	MS-DOS	256K bits	360K bits	NA	4.77, 8 selectable	0	1	1	19.0 x 14.0 x 5.0	$449
Baby Micro, Inc. (303) 790-7719	Junior-286	80286	MS-DOS	512K-640K bits	1.2M bytes	NA	6, 8, 10, 12 selectable	6	1	1	—	$1,299
	Baby-286	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,299
BAK (617) 756-3320	PC-AT Clone	8086-2	MS-DOS	1M byte	1.2M bytes	30M bytes	8, 10 selectable	8	2	1	21.3 x 17.3 x 6.8	$2,295
	386	80386	MS-DOS	1M byte	1.2M bytes	40M bytes	16	8	2	1	21.3 x 17.3 x 6.8	$4,494
Basic Time, Inc. (408)-727-0877	Basic Time AT	80286	MS-DOS	640K bits-2M bytes	1.2M bytes	44M bytes	6, 8, 10 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,595
Bentley Computer Products (512) 250-9897	Bentley-286-10	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	$1,036
	Bentley-286-8	80286	MS-DOS	—	1.2M bytes	NA	6, 8 selectable	8	0	0	21.3 x 17.3 x 6.8	$995
Bi-Tech Enterprises, Inc. (516) 567-8155	Long Island PC/AT II	8086-2	MS-DOS 3.2	640K bits	360K bits-1.2M bytes	20M-140M bytes	6, 10 selectable	8	1	1	16.5 x 19.5 x 6.5	$1,765
	Long Island PC/AT	8086-2	MS-DOS 3.2	1M byte	360K bits-1.2M bytes	20M-140M bytes	6, 10 selectable	8	1	1	16.5 x 21.5 x 6.5	$1,765
	Long Island PC/AT 386	80386	MS-DOS 3.2	512K bits	360K bits	20M-170M bytes	15	8	1	1	16.5 x 21.5 x 6.5	$2,765
Bloatax Systems, Inc. (818) 442-0020	BPK-0002	80286	MS-DOS	256K-640K bits	360K bits	NA	—	0	0	0	13.0 x 13.0 x 7.0	$425
Bondwell Industrial Co. (415) 490-4300	Bondwell 8	8088	MS-DOS 3.3	512K bits	720K bits	NA	4.77	0	1	1	11.0 x 12.2 x 3.1	From $1295
Britek (408) 727-8587	Britek-AT Turbo	80286	MS-DOS	512K bits	1.2M bytes	20M bytes	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,375
Canon USA, Inc. (516) 488-6700	A-200 EX	80286	MS-DOS 3.0	640K bits	1.2M bytes	20M-40M bytes	8	8	1	1	21.3 x 17.3 x 6.8	$3,795
Cantech (415) 791-7091	Cantech Turbo-286	80286	MS-DOS 3.1, 3.2	1M byte	360K bits-1.2M bytes	40M bytes	8, 10 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,995
Carterfone Communications Corp. (214) 630-9700	Carterfone Model 286	80286	MS-DOS 3.2	640K bits	360K bits	30M bytes	8	8	1	1	21.3 x 17.3 x 6.8	$2,995

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors.

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International Software Listings
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Software Descriptions and Reviews
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COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Cascade Electronics, Inc. (507) 645-7997	AT-Compatible System	80286	MS-DOS 3.2	512K-1M bits	360K bits-1.2M bytes	20M, 30M, 40M, 80M bytes	6, 10	8	1	1	Standard	$1,095
Century Micro Systems (714) 666-2233	CMS-AT-Series	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	6	0	0	21.0 x 16.0 x 6.0	$1,095
	CMS-1300-Series	80286	MS-DOS 3.2	640K bits-1M byte	1.2M bytes	NA	6, 8 selectable	6	0	1	19.0 x 15.0 x 8.0	$1,595
Chicago Computer Connection, Inc. (800) 422-2666	CCC-386C	80386	MS-DOS 3.1	1M-4M bytes	1.2M bytes	NA	4.77, 8, 10, 16 selectable	8	0	1	21.3 x 17.3 x 6.8	$2,995
	CCC-ATC	80286	MS-DOS 3.1	640K bits-1M byte	360K bits	NA	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$999
Clone Factory (213) 477-0447	AT-Clone	80286	MS-DOS 3.2	640K bits	1.2M bytes	20M bytes	8, 10 selectable	8	1	1	21.125 x 16.5 x 6.5	$1,373
Clone Technologies, Inc. (913) 469-0400	Clone AT-1800	80286	MS-DOS 3.2	1M byte	1.2M bytes	30M bytes	10	8	0	1	21.3 x 17.3 x 6.8	$1,595
	Clone AT-1	80286	MS-DOS 3.2	640K bits	1.2M bytes	30M bytes	6, 8 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,495
	Clone AT-1	80286	MS-DOS 3.2	640K bits	1.2M bytes	NA	6, 8 selectable	8	0	1	21.3 x 17.3 x 6.8	$949.50
Club AT, Inc. (415) 490-2201	Club-10 MEG-0 Wait State	8086	MS-DOS 3.1, 3.2	512K bits	1.2M bytes	NA	8, 10 selectable	8	2	1	21.3 x 17.0 x 6.8	$1,395
	Club-10 MEG-1 Wait State	8086	MS-DOS 3.1, 3.2	512K bits	1.2M bytes	NA	10.3	8	0	0	21.3 x 17.0 x 6.8	$1,175
	Club 286	80286	MS-DOS 3.1, 3.2	512K bits	1.2M bytes	NA	7.2	8	0	0	21.3 x 17.0 x 6.8	$1,075
Columbia Data Products, Inc. (305) 774-1111	Violin-ATC	80286	MS-DOS 3.2	512K bits	360K bits	20M-120M bytes	6, 8 selectable	12	1	1	21.3 x 17.3 x 6.8	$2,300
Comark Corp. (312) 351-9700	Tatung-TCS-7000 Turbo series	80286	MS-DOS 3.1	640K bits	1.2M bytes	20M-130M bytes	6, 8, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,900
Compaq Computer Corp. (713) 370-0670	Deskpro 286 series	80286	MS-DOS, Basic 3.1, 3.2	256K bits-2.1M bytes	1.2M bytes	0-80M bytes	8, 12 selectable	7	—	—	—	$2,999-$4,999
	Portable III series	80286	MS-DOS	640K bits-6.6M bytes	1.2M bytes	0-40M bytes	8, 12 selectable	2	—	—	16.0 x 9.8 x 7.8	$3,999-$5,799
	Portable II series	80286	MS-DOS	256K-640K bits	360K bits-1.2M bytes	0-20M bytes	6, 8 selectable	2	—	—	17.7 x 13.9 x 7.5	From $2,999
	Deskpro 386	80386	MS-DOS, Basic 3.1, 3.2	1M-10M bytes	360K bits-1.2M bytes	40M-130M bytes	16	5	1	1	19.8 x 16.5 x 6.4	$6,499-$8,799
Competitive Computer Components (800) 443-9834	Professional AT	80286	—	1M byte	360K bits	30M bytes	40	8	0	1	21.3 x 17.3 x 6.8	$1,887
	Enhanced AT	80286	—	1M byte	1.2M bytes	NA	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,185
	Enhanced 386	80386	MS-DOS	1M byte	360K bits-1.2M bytes	NA	16	8	0	1	21.3 x 17.3 x 6.8	$2,499
	Advanced 386	80386	MS-DOS	1M byte	360K bits-1.2M bytes	30M bytes	16	8	0	1	21.3 x 17.3 x 6.8	$3,149
Compuadd (512) 250-1489	Standard 88 Turbo	8088	MS-DOS	256K bits	360K bits	NA	4.77, 8 selectable	8	0	0	—	$395
Compucorp (213) 306-2626	Connection 80286	80286	Concurrent DOS	640K bits	1.2M bytes	20M-40M bytes	8, 10 selectable	8	2	2	21.3 x 17.3 x 6.8	Contact vendor
Computer Age, Inc. (203) 724-5100	Computech AT	80286	MS-DOS 3.1	640K bits-1M byte	1.2M bytes	NA	6.67, 8 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,595
Computrade, Inc. (408) 435-2662	Novas 286 AT	80286	MS-DOS 3.1	640K bits	—	NA	8, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	$465
Computer Classified, Inc. (800) 331-5150	CCI ST/386	80386	MS-DOS 3.2, Xenix, Novell	640K bits-12M bytes	1.2M bytes	NA	16.2	8	2	1	19 x 16.4 x 6.2	$3,195
	CCI ST/286-12	80286	MS-DOS 3.1, Xenix, Novell	640K bits-3M bytes	1.2M bytes	NA	12.5	8	1	1	19 x 16.4 x 6.2	$1,895
Computer Components Corp. (800) 843-7012	CCC-365/AT	80286	MS-DOS 3.2	1M byte	1.2M bytes	NA	6, 8 selectable	8	2	1	21.3 x 17.3 x 6.8	$2,395
Computer Creations, Inc. (513) 836-5707	Business System-AT	80286	—	1M byte	1.2M bytes	NA	6, 8 selectable	8	0	0	21.3 x 17.3 x 6.8	$999
Computer Direct (512) 836-7260	Computer Direct-286-10	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	6, 10 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,289
Computerland Corp. (415) 639-2025	BC-286	80286	MS-DOS 3.2	512K bits	NA	NA	6, 8 selectable	8	2	1	16.25 x 16.25 x 6.25	$2,895
Computer Library (415) 659-8784	10-MHz Plus AT Compatible	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	8, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	$950
Computer Mail Order (800) 233-8950	CMO-PC Too-AT	80286	MS-DOS 2.1	512K bits	1.2M bytes	NA	8, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,019-$1,199
Computer Products United (800) 824-2936	CPU-AT 286-10	80286	MS-DOS 3.1	512K bits	1.2M bytes	20M bytes	8, 10 selectable	8	0	0	19.4 x 16.7 x 5.7	$1,390
	CPU-Mini 286-8	80286	MS-DOS 3.1	512K bits	1.2M bytes	20M bytes	8	8	0	0	19.4 x 16.7 x 5.7	$1,290
Computer Systems (313) 779-8700	Rugged PC/86	80286	MS-DOS 3.2, Unix	—	360K bits-1M byte	NA	8, 10 selectable	7	1	1	21.3 x 17.3 x 6.8	$1,900
	PC/86	80286	MS-DOS 3.2, Unix	640K bits-2M bytes	360K bits-1M byte	NA	8, 10 selectable	7	1	1	21.3 x 17.3 x 6.8	$1,500
	PC 386 series	80386	MS-DOS, Unix	1M byte	360K bits-1M byte	40M-144M bytes	12	8	1	1	21.3 x 17.3 x 6.8	From $3,900
Continental Peripheral Unlimited (818) 282-3121	Super IAT	80286	MS-DOS 3.2	1M byte	360K bits-1.2M bytes	30M bytes	6, 8 selectable	8	1	1	—	$1,795
Cordata Technology, Inc. (805) 375-1500	AT-D-Desktop Computer	80286	MS-DOS 3.1	640K bits	1.2M bytes	NA	8	6	1	1	21.3 x 17.3 x 6.8	$1,895
	AT-D-AQ-20	80286	MS-DOS 2.1	640K bits	1.2M bytes	20M bytes	8	6	1	1	21.3 x 17.3 x 6.8	$2,395
Core International, Inc. (305) 997-6055	Atomizer	80286	MS-DOS 3.3	1M byte	1.2M bytes	43M bytes	8	8	2	1	21.3 x 17.3 x 6.8	$3,895
Data Dynamics (800) 351-7832	Data Dyanmics Computer	—	MS-DOS 3.2	1M byte	1.2M bytes	NA	—	8	0	1	21.3 x 17.3 x 6.8	$1,150
Data General Corp. (800) 343-8842	Dasher 286 Intelligent Workstation	80286	MS-DOS 3.1, 3.2	640K bits-9M bytes	1.2M bytes	0-20M bytes	6, 10 selectable	6	2	1	16.0 x 18.0 x 6.0	From $2,470

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Data-Lite Systems (805) 584-9104	DL-386	80386	MS-DOS 3.2	1M byte	1.2M bytes	40M bytes	16	7	1	1	21.3 x 17.3 x 6.8	$3,295
	DL-286	80286	MS-DOS 3.2	640K bits	1.2M bytes	20M bytes	6, 8 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,425
Digital Equipment Corp. Contact local sales office	Vaxmate	80286	MS-DOS 3.1	1M-3M bytes	1.2M bytes	0-20M bytes	8	2	2	0	16 x 15.5 x 11.5	$4,045
80 Microcomputer Service, Inc. (518) 393-2494	80 Micro 286-8+	80286	MS-DOS 3.2, GW-Basic	512K-640K bits	1.2M bytes	40M bytes	8	8	1	1	21.3 x 17.3 x 6.8	$2,495
	80 Micro 386-14	80386	MS-DOS 3.2, GW-Basic	640K bits	1.2M bytes	40M bytes	14	6	1	1	—	$4,695
	80 Micro 286-12 Plus	80286	MS-DOS 3.2, GW-Basic	512K bits	1.2M bytes	40M bytes	12	8	1	1	21.3 x 17.3 x 6.8	$2,695
Eastern Enterprises, Inc. (213) 725-3080	Enterprise AT	80286	MS-DOS 3.2	640K bits	1.2M bytes	30M-82M bytes	8, 10	8	1	1	Standard	Contact vendor
Electro-Design, Inc. (619) 471-0680	IMP-286 TC	80286	MS-DOS 3.2, 3.3	640K bits	360K bits	30M bytes	16	8	1	1	—	$3,995
	IMP 286-161	80286	MS-DOS 3.2	512K bits	360K bits	30M bytes	16	—	—	—	Standard	$3,995-$4,695
Eltech Research, Inc. (408) 943-1764	ELT 286-8	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	8	0	0	21.1 x 17.9 x 6.4	$995
	ELT 286-8 Plus	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	8	2	1	21.1 x 17.9 x 6.4	$1,175
	ELT 286 System	80286	MS-DOS	512K bits	1.2M bytes	NA	6, 10 selectable	8	0	0	21.1 x 17.9 x 6.4	$1,024
	ELT 286-10 Plus	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	8	2	1	21.1 x 17.9 x 6.4	$1,325
Epson America, Inc. (213) 539-9140	Equity III PLUS	80286	MS-DOS 3.2	640K bits-15.5M bytes	1.2M bytes	0-40M bytes	6, 8, 10 selectable	9	1	1	19.6 x 17.4	$2,495-$3,495
Everex Systems, Inc. (415) 498-1111	System 1800 Plus	MS-DOS, Xenix, Unix, Novell	512K bits-1M byte	360K bits	270K bits-1.2M bytes	0-133M bytes	8, 10 selectable	8	0	0	Standard	Contact vendor
Falcon Systems, Inc. (312) 541-3933	AT-System-Tatung	80286	MS-DOS 3.2	640K bits	360K bits	30M-40M bytes	10	8	1	1	21.3 x 17.3 x 6.8	$2,500
Five Star Computers (800) 752-5555	Five Star 286/10	80286	MS-DOS 3.1, 3.2	640K bits	360K bits-1.2M bytes	30M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,695
	Five Star 286	80286	MS-DOS 3.1	640K bits	360K bits	NA	6, 10 selectable	12	2	2	—	$1,295
47th Street Photo (800) 221-7774	Maxum 286 Turbo	80286	MS-DOS 3.2	640K bits-1M byte	1.2M bytes	24M bytes	8, 12 selectable	8	0	0	21.3 x 17.3 x 6.8	From $1,095
GEMS Computers (408) 988-0161	GEMS Computer-GAT	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	6, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	$975
	GEMS AT-Monochrome System	80286	MS-DOS 3.1	1M byte	360K bits-1.2M bytes	20M bytes	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,550
Grid System Corp. (415) 961-4800	Grid 286	80286	MS-DOS 3.2	640K bits-2M bytes	720K bits	10M bytes	4.77, 8 selectable	0	1	1	14.0 x 12.0 x 3.0	$3,850
Gulfstream Micro Systems, Inc. (305) 994-6500	GMS Sat/386	80386	MS-DOS 3.2, Xenix	760K bits-3M bytes	1.2M bytes	10M-140M bytes	14	8	0	0	19.6 x 16.1 x 5.5	$4,565
	GMS Sat/286	80286	MS-DOS 3.2	1M byte	1.2M bytes	10M-140M bytes	10	8	0	0	19.6 x 16.1 x 5.5	$2,299
Hewlett-Packard Co. (800) FOR-HPPC	HP Vectra PC	80286	MS-DOS, PC-DOS	640K bits-6M bits	360K bits-1.2M bytes	20M, 40 bytes	8	7	1	1	16.7 x 15.4 x 6.3	Contact vendor
	HP Vectra PC	80286	MS DOS 3.1	640K bits	360K bits-1.2M bytes	40M bytes	8	4-7	1	1	16.7 x 15.4 x 6.3	$3,099-$4,795
Honeywell Bull, Inc. (617) 895-6000	PC-AP	80286	MS-DOS 2.1	256K bits-4M bytes	1.2M bytes	20M-60M bytes	8	8	1	1	21.18 x 16.54 x 6.14	$3,565
Imperial Computer Corp. (818) 285-1256	Mini AT System	80286	MS-DOS	512K bits	1.2M bytes	—	12	—	0	0	21.3 x 17.3 x 6.8	$1,290
	Turbo AT	80286	MS-DOS 3.1, 3.2	256K-1M byte	—		4.77, 6, 10, 12 selectable	8	—	—	—	Contact vendor
	IMP 007	80286		512K-1M byte	1.2M bytes		6, 10, 12 selectable	8	—	—	—	$1,240
Indtech, Inc. (408) 743-4300	Indtech 5191	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	8, 10 selectable	12	0	0	21.3 x 17.3 x 6.8	Contact vendor
	Indtech 5170	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 8 selectable	12	0	0	21.3 x 17.3 x 6.8	Contact vendor
Industrial Computer Products (617) 356-7500	Pro PC AT Turbo	80286	MS-DOS 3.2	1M byte	1.2M bytes	20M-170M bits	6, 10 selectable	8	1-8	1-2	18 x 21 x 6	$1,595-$5,700
Information & Technology Services, Inc. (800) 642-2395	ITS Turbo 286 AT	80286	MS-DOS 3.1	512K bits-1M byte	360K bits	44M bytes	6, 8, 10 selectable	8	2	1	—	$1,195
	ITS System 386	80386	MS-DOS 3.1	512K bits	360K bits-1.2M bytes	40M-133M bytes	18	8	1	1	—	$3,995
Innovative Technology Ltd. (800) 253-4001	Affordable AT	80286	MS-DOS	256K bits-1M byte	1.2M bytes	0-100M bytes	6, 8, 10 selectable	8	0	0	21.3 x 17.3 x 17.3	$1,099
Intelligent Data Systems, Inc. (213) 633-5504	PC-286	80286	MS-DOS	512K bits-1M byte	360K bits-1.2M bytes	0-180M bytes	6, 10 selectable	8	1	1	21.25 x 17.5 x 6.0	$1,895
Intelligent Micro Systems Corp. (800) 624-4031	IMS-286	80286	MS-DOS 3.2	512K-640K bits	1.2M-2M bytes	20M-70M bytes	10	8	0	0	20.0 x 16.0	$1,035-$1,145
	IMS-286/TEM	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	8	0	0	21.0 x 16.0	$1,035
International Systems Marketing, Inc. (301) 670-1813	ISM Express 286 RGB	80286	MS-DOS 3.2	640K bits-8M bytes	360K bits-1.2M bytes	0-160M bytes	6, 10 selectable	8	1	1	19.0 x 18.0 x 8.5	$4,095
Intronics Computer Corp. (800) 422-3366	Master Series AT/12	80286	MS-DOS, PC-DOS, Unix	1M byte	1.2M bytes	0-300M bytes	6, 12 selectable	8	0	0	21.3 x 17.3 x 6.8	$1,645
	Master Series AT/10	80286	MS-DOS, PC-DOS, Unix	1M byte	1.2M bytes	0-300M bytes	6, 10 selectable	8	0	0	21.3 or 19.6 x 17.3 or 16.1 x 6.8 or 5.5	$1,295

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Ivy Microcomputer Corp. (617) 853-6914	DT-20	80286	MS-DOS 3.1	512K bits-14M bytes	1.2M bytes	20M-160M bytes	6, 8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,695
	DT-40	80286	MS-DOS 3.1	512K bits-14M bytes	1.2M bytes	40M bytes	6, 8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,995
	DT-80	80286	MS-DOS 3.1	512K bits-14M bytes	1.2M bytes	80M bytes	6, 8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$2,495
	Portable 2 series	80286	MS-DOS 3.1	512K bits-14M bytes	360K bits	20M-80M bytes	8	6	1	1	18.0 x 14.0 x 9.0	$2,795
JC Infor Systems Corp. (415) 659-8440	JC Lips	80286	MS-DOS	512K-1M bits	360K bits-1.2M bytes	20M-80M bytes	8,10	8	2	1	—	Contact vendor
Joy Systems, Inc. (408) 435-0980	JS-286 series	80286	MS-DOS, PC-DOS	512K bits-1M byte	360K bits-1.44M bytes	0-133M bytes	8, 10 selectable	8	0	0	21.3 x 17.3 x 6.8	From $1,695
Kaypro Corp. (800) 4KAYPRO	Kaypro 286 I series	80286	MS-DOS	640K bits-16M bytes	1.2M bytes	40M bytes	10	8	1	1	21.25 x 17.0 x 6.24	$1,995-$2,995
Leading Edge Hardware Products, Inc. (617) 828-8150	Model D2	80286	MS-DOS	640K bits-1M byte	—	30M bytes	6, 8, 10 selectable	6	—	—	15.5 x 16.0 x 6.1	$1,936-$2,914
Lee Data Corp. (800) LEEDATA	Series 80	80286	MS-DOS	640K bits-1M byte	1.2M bytes	20M-40M bytes	10	8	2	1	21.0 x 16.5 x 6.6	From $3,995
Lolir Corp. (214) 234-8032	Lolir 386	80386	MS-DOS 3.3	640K bits-16M bytes	360K bits-1.2M bytes	30M-120M bytes	16	8	1	1	21.3 x 17.3 x 6.8	From $2,695
	Lolir 286	80286	MS-DOS 3.2	640K bits-1M byte	360K bits-1.2M bytes	20M-120M bytes	10	8	1	1	21.3 x 17.3 x 6.8	$1,600
Lucky Computers (214) 690-6110	G AT	80286	MS-DOS	1M byte	360K bits-1.2M bytes	30M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,995
MAD Intelligent Systems, Inc. (408) 943-1711	MAD D3000	80386	MS-DOS, PC-DOS, Unix System V.3, Xenix, Venix, Concurrent DOS	1M-16M bytes	—	85M bytes	—	8	4	1	16.25 x 17.0 x 6.10	Contact vendor
	RDDS 3000 AI Workstation	80386	MS-DOS, Unix System V.3	4M-16M bytes	—	85M bytes	16	8	—	—	16.25 x 17.0 x 16.25	Contact vendor
	MAD D2000	80286	MS-DOS, PC-DOS, Unix V.3, Xenix, Venix, Concurrent DOS	1M byte	—	NA	10	8	4	1	16.25 x 17.0 x 6.10	Contact vendor
Magitronic Technology, Inc. (718) 706-7670	AT System 1000	80286	MS-DOS 3.2	1M byte	1.2M-4M bytes	0-20M bytes	10	8	0	1	21.3 x 17.3 x 6.8	$1,259
Main Street Computer Products, Inc. (617) 393-3397	MS T2000	80286	MS-DOS, PC-DOS	1M byte	360K bits	0-160M bytes	6, 8 selectable	8	2	1	21.3 x 17.3 x 6.8	From $1,695
Markham International Ltd. (617) 769-7272	Markham International AT	80286	MS-DOS 3.2	640K bits	1.2M bytes	User-defined	6, 8, 11.25 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,275
May Computers Corp. (714) 897-2037	Baby 286	80286	MS-DOS 3.2	1M byte	360K bits	0-80M bytes	6, 10, 12 selectable	8	1	1	19.1 x 21.8 x 8.2	Contact vendor
Microcomputer Concepts (800) 772-3914	AT-Compatible System	80286	MS-DOS	1M byte	1.2M bytes	NA	6, 8 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,399
Micro Express (714) 662-1973	ME 286 series	80286	MS-DOS 3.2	1M byte	1.2M bytes	20M-120M bytes	8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,299-$1,799
	ME 386	80386	MS-DOS 3.2	512K bits	1.2M bytes	30M-120M bytes	16	8	1	1	21.3 x 17.3 x 6.8	$2,895
Micro Five Corp. (714) 957-1517	Series 5000	80286	MS-DOS, Xenix, Pick, Basic, Novell	1M-16M bytes	1.2M-2.4M bytes	20M-390M bytes	8, 12 selectable	9	1	1	23.0 x 19.0 x 7.0	$2,450
	Series 6000	80286	MS-DOS, Xenix, Pick, Basic, Novell	1M-16M bytes	1.2M-2.4M bytes	20M-140M bytes	10	6	1	1	15.0 x 16.0 x 7.0	$1,595
Micropeach, Inc. (714) 995-3600	Peach 2000	80286	MS-DOS, PC-DOS	640K bits-1M byte	1.2M bytes	30M-40M bytes	6, 8 selectable	8	0	0	21.3 x 17.3 x 6.8	Contact vendor
Micro Smart, Inc. (617) 872-9090	Turbo M 286	80286	MS-DOS	1M byte	1.2M bytes	NA	6, 8, 12 selectable	8	2	1	21.3 x 17.3 x 6.8	$1,199.95
Microstar (312) 968-3323	Microstar AT	80286	MS-DOS	1.2M bytes	360K bits-1.2M bytes	30M bytes	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,899
Micro Systems Engineering Corp. (408) 257-4249	Turbo AT	80286	MS-DOS 3.1, 3.2, 3.3	640K bits-1M byte	360K bits-1.2M bytes	20M-80M bytes	12	8	1	1	21.3 x 17.3 x 6.8	$1,295
	Micro 286	80286	MS-DOS 3.1, 3.2, 3.3	640K bits-1M byte	360K bits-1.2M bytes	20M-80M bytes	10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,095
Mini-Micro Business Systems (303) 444-3746	751 Laptop Portable/386	80386	MS-DOS 3.3, MS OS/2, Unix, Xenix	512K bits	360K bits-1.2M bytes, 720K bits	20M-100M bytes	16	5	1	1	9.5 x 15.5 x 6.8	$3,995
	TSI PC Tower/VA	80286	MS-DOS 3.0, 3.3	512K bits	1.2M bytes	Optional	8	8	1	1	20 x 22 x 8	$995
	TSI Laptop Portable/286	80286	MS-DOS, Xenix	1M byte	1.2M bytes	20M-200M bytes	12	5	1	1	9.5 x 15.5 x 8	$2,995
	TSI PC-Tower/386	80386	MS-DOS 3.3, MS OS/2, Unix, Xenix	1M-16M bytes	360K bits-1.2M bytes	40M-1,500M bytes	16, 20 selectable	8	1	1	8 x 22 x 20	$4,995-$5,795
Mitac International (800) 321-8344	Computitan AT	80286	MS-DOS 3.2, GW-Basic	1M byte	1.2M bytes	NA	10	8	0	0	Standard	$1,025
	Computitan AT Plus	80286	MS-DOS 3.2, GW-Basic	1M byte	1.2M bytes	30M bytes	10	8	0	0	Standard	$2,110
The Mom Corp. (800) 241-1170	Smartstation AT	80286	MS-DOS 3.2	1M byte	360K bits-1M byte	0-300M bytes	6, 8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	Contact vendor
NCR Corp. (513) 445-7478	3390 Workstation	80286	MS-DOS	512K-640K bits	720K bits	20M bytes	6, 10 selectable	1	2	1	11.0 x 15.0 x 2.75	From $895
	PC8	80286	MS-DOS, Xenix	256K-640K bits	360K bits-1.2M bytes	20M-128M bytes	6, 8 selectable	8	1	1	21.0 x 16.0 x 6.0	From $2,995

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
NEC Information Systems, Inc. (617) 264-8000	APC IV Powermate 2	80286	MS-DOS 3.2	640K bits-10.5M bytes	360K bits-1.2M bytes	20M-66M bytes	8, 10 selectable	8	2	1	18.0 x 16.5 x 6.0	$2,595
	APC IV Powermate 1	80286	MS-DOS 3.2	640K bits-8.6M bytes	1.2M bytes	20M-40M bytes	8	6	1	1	16.5 x 16.5 x 6.0	$1,995
	APC IV Businessmate	80286	MS-DOS, SCO-Xenix	640K bits-10.6M bytes	1.2M bytes	66M bytes	8, 10	—	8	—	—	Contact vendor
Nippon Electronic Technology Corp. (415) 490-4650	V286	80286	MS-DOS 3.2	1M byte	360K bits-1.2M bytes	40M-120M bytes	6, 8, 10 selectable	8	1	1	—	Contact vendor
Norrell Corp. (213) 451-5258	386 Compatible	80386	MS-DOS	1M-4M bytes	360K bits-1.2M bytes	85M-170M bytes	16	8	1	1	21.3 x 17.3 x 6.8	Contact vendor
	286 System	80286	MS-DOS	1M byte	360K bits-1.2M bytes	33M-170M bytes	10	8	1	1	21.3 x 17.3 x 6.8	Contact vendor
Olivetti USA (201) 526-8200	M28	80286	MS-DOS	512K-640K bits	360K bits	20M-70M bytes	8	7	1	1	16.6 x x 15.2 x 7.3	$4,450
Orientec of America (213) 268-4001	Orientec AT	80286	MS-DOS	1M byte	360K bits-1.2M bytes	20M-80M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,599
Packard Bell Electronics, Inc. (800) 521-7979	VT286 Business Computer	80286	MS-DOS 3.2, Xenix, GW-Basic	640K bits-1M byte	1.2M bytes	20M-170M bytes	8, 10 selectable	8	1	1	21.25 x 17.24 x 6.24	$2,495-$2,795
PC American Marketing, Inc. (800) 654-5365	PC-AM 8-MHz Turbo System	8088	MS-DOS	640K bits	360K bits	20M-130M bytes	8	8	1	1	21.3 x 17.3 x 6.8	$895
PC Buyers Group (800) 822-8937	AT Plus	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$995
PC Designs, Inc. (918) 252-5550	GV286	80286	MS-DOS, Unix, Xenix	1M byte	360K bits-1.2M bytes	24M-30M bytes	12	6	2	1	21.3 x 17.3 x 6.8	$3,525
	GV386	80386	MS-DOS, Unix, Xenix	1M-4M bytes	360K bits-1.2M bytes	40M-130M bytes	16	6	2	1	21.3 x 17.3 x 6.8	$3,950
PC Pro Systems (800) 451-5279	Turbo 286	80286	MS-DOS	384K bits-1M byte	1.2M bytes	30M-130M bytes	6, 10	8	1	1	—	From $1,199
PC's Limited (800) 426-5150	PC's 286/12	80286	MS-DOS	1M-8M bytes	360K bits-1.2M bytes	20M-80M bytes	6, 12 selectable	8	2	1	21.3 x 17.3 x 6.8	From $2,964
	PC's 286	80286	MS-DOS	1M-8M bytes	360K bits-1.2M bytes	20M-80M bytes	6, 8 selectable	8	2	1	21.3 x 17.3 x 6.8	From $1,764
Pine Computer, Inc. (818) 575-1882	Pinecom AT	80286	MS-DOS 3.1	512K bits-1M byte	360K bits-1.2M bytes	30M bytes	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	$1,399
PMA (415) 968-5755	PMA AT	80286	MS-DOS 3.0 or higher	1M byte	360K bits-1.2M bytes	User-defined	6, 8 selectable	8	User-de-fined	User-de-fined	21.3 x 17.3 x 6.8	Contact vendor
Princeton Computer Products (609) 799-4440	AT System IV	80286	MS-DOS, PC-DOS 3.1, 3.2	1M byte	360K bits-1.2M bytes	40M bytes	6, 8 selectable	8	0	1	21.0 x 16.0 x 6.5	$2,295
Proteus Technology Corp. (201) 288-8629	Proteus 286 Standard	80286	MS-DOS	1M-4M bytes	360K bits-1.2M bytes	20M-360M bytes	6, 10 selectable	8	3	2	21.3 x 17.3 x 6.8	$2,195
	Proteus 286E	80286	MS-DOS	1M-4M bytes	1.2M bytes	20M-360M bytes	6, 8, 10 selectable	8	2	2	21.3 x 17.3 x 6.8	From $1,295
	Proteus 286 X16	80286	MS-DOS	1M-4M bytes	360K bits-1.2M bytes	0-360M bytes	6, 8, 16 selectable	8	3	2	21.3 x 17.3 x 6.8	$2,945
	Proteus 286 GT	80286	MS-DOS	1M-4M bytes	360K bits-1.2M bytes	0-360M bytes	10, 12 selectable	8	3	2	21.3 x 17.3 x 6.8	$2,495
QIC Research, Inc. (408) 942-8086	QIC 286-QT	80286	MS-DOS, PC-DOS	512K bits-1M byte	1.2M bytes	NA	8	8	0	0	21.3 x 17.3 x 6.8	$1,026
	QIC 1800A	80286	MS-DOS, PC-DOS	512K bits-1M byte	1.2M bytes	NA	10	8	0	0	21.3 x 17.3 x 6.8	$1,125
Romanicus Corp. (213) 327-9300	10-MHz Color System	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	20M bytes	6, 10 selectable	8	—	1	21.3 x 17.3 x 6.8	$1,255-$1,455
Samson Computer International Co. (818) 284-1680	AT PC Compatible	80286	MS-DOS 3.2	1M byte	1.2M bytes	30M bytes	6, 8 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,999
Sanyo Business Systems Corp. (201) 440-9300	MBC-990	80286	MS-DOS 3.1	512K bits	1.2M bytes	NA	6, 8 selectable	8	0	0	—	$1,999
Sefco Computer Products (213) 205-0828	Baby AT	80286	MS-DOS 3.1, 3.2	1M byte	360K bits-1.2M bytes	NA	6, 10 selectable	8	1	1	—	$800-$900
SF Micro (415) 929-1505	SF 286 Model 1800	80286	MS-DOS 3.2	512K bits	1.2M bytes	30M bytes	8	8	1	1	21.2 x 16.6 x 6.5	$1,595
	SF 286 Model 1800A	80286	MS-DOS 3.2	512K bits	1.2M bytes	30M bytes	10	8	1	1	21.2 x 16.6 x 6.5	$1,695
Shamrock (805) 373-7847	Shamrock 286-10	80286	MS-DOS 3.2	640K bits	1.2M bytes	20M bytes	6, 10 selectable	8	0	0	21.25 x 6.24 x 7.24	$1,249
Southern California Systems, Inc. (800) 237-SCSI	SCSI 286-10/0	80286	MS-DOS 3.1 or higher	512K bits-1M byte	1.2M bytes	30M-80M byte	10	8	2	1	21.3 x 17.3 x 6.8	$1,390
	SCSI 286	80286	MS-DOS 3.2 or higher	512K bits-1M byte	1.2M bytes	20M-80M bytes	8	8	0	1	21.3 x 17.3 x 6.8	$1,028
	SCSI 286-10	80286	MS-DOS 3.2 or higher	512K bits-1M byte	1.2M bytes	20M-80M bytes	10	8	0	1	21.3 x 17.3 x 6.8	$1,128
Suntronics, Inc. (213) 644-1140	Sun 286 Plus	80286	MS-DOS, PC-DOS, Xenix	512K bits-1M byte	360K bits-1.2M bytes	20M-80M bytes	6, 8 selectable	7	0	1	19.0 x 16.5 x 6.0	From $1,130
Supreme Techtronics Corp. (408) 437-1306	STC Escort PC 1990 Smark 80	80286	MS-DOS 3.2	1M byte	1.2M bytes	20M-40M bytes	6, 8, 10, 12 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,974
Supreme USA, Inc. (714) 739-0106	GAT-286	80286	MS-DOS	1M byte	360K bits-1.2M bytes	20M-140M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	From $1,295

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Talbott Development Corp. (702) 795-8815	Comet AT	80286	MS-DOS, PC-DOS	512K bits-10M bytes	360K bits-1.2M bytes	20M-70M bytes	10, 12 selectable	8	4	3	21.25 x 17.28 x 6.38	$1,837-$2,962
	Comet AT 386	80386	MS-DOS, PC-DOS	512K bits-15M bytes	360K bits-1.2M bytes	20M-140M bytes	16, 20 selectable	8	4	3	21.25 x 17.28 x 6.38	$4,342-$5,342
	Portable Comet AT-286	80286	MS-DOS, PC-DOS	512K bits-10M bytes	360K bits-1.2M bytes	20M-70M bytes	10, 12 selectable	8	4	3	19.0 x 17.28 x 7.75	From $2,363
	286 or 386 Laptop	80286, 80386	MS-DOS, PC-DOS	640K bits-8M bytes	360K bits-1.2M bytes	40M-140M bytes	16	5	—	—	—	Contact vendor
	Portable Comet AT-386	80386	MS-DOS, PC-DOS	512K bits-15M bytes	360K bits-1.2M bytes	20M-140M bytes	16	8	4	3	19.0 x 17.28 x 7.75	$5,000-$7,000
Tandon Corp. (818) 993-6644	Targa-40	80286	MS-DOS 3.2	1M-16M bytes	1.2M bytes	40	6, 8, selectable	5	1	—	Standard	$2,499
	Targa-20	80286	MS-DOS 3.2	1M-16M bytes	1.2M bytes	20	6, 8 selectable	5	1	—	Standard	$1,999
	PCA series	80286	MS-DOS 3.2	1M byte-16M bytes	1.2M bytes	0-70M bytes	6, 8 selectable	8	1	1	Standard	$1,899-$3,699
Tandy Corp. (817) 878-4969	Tandy 3000 HD	80286	MS-DOS 3.2	512K-640K bits	1.2M bytes	20M-40M bytes	8	10	1	1	19.0 x 18.0 x 6.5	$2,199-$4,299
Tatung Co. of America, Inc. (213) 979-7055	TCS-7000	80286	MS-DOS 3.2	640K bits-1M byte	1.2M bytes	NA	6, 8, 10 selectable	8	0	0	21.25 x 17.0 x 6.0	From $2,195
Technoland, Inc. (800) 222-3978	Technoland 286	80286	MS-DOS	512K bits-1M byte	1.2M bytes	NA	8	8	0	0	Standard	From $1,059
Televideo Systems, Inc. (408) 745-7760	Televideo Telecat-286 series	80286	MS-DOS 3.1	512K bits-1M byte	1.2M bytes	20M-40M bytes	6, 8	5	1	1	16.0 x 16.5	Contact vendor
Telex Computer Products, Inc. (918) 627-1111	1280 Intelligent Workstation	80286	MS-DOS 3.1, Xenix, Unix	512K bits	360K bits-1.2M bytes	10M-70M bytes	6, 10 selectable	6	1	1	18.25 x 16.0 x 6.67	$2,335-$6,000
Tempest Products, Inc. (703) 471-6960	Tempest AT	80286	MS-DOS, Xenix, Unix	1M byte	1.2M bytes	2M-144M bytes	6, 8 selectable	8	2	1	23.3 x 17.5 x 7.2	From $4,999
Texas Instruments, Inc. (800) 232-3200	The Business-Pro	80286	MS-DOS 3.0, Xenix 3	512K bits	—	21M, 40M, 72M, 145M bytes	6	14	1	1	7.8 x 18.5 x 18.6	$3,995-$9,185
Toshiba America, Inc. (714) 730-5000	T3100	80286	MS-DOS 3.2	640K bits-2.6M bytes	720K bits	10M bytes	4.77, 8 selectable	1	1	1	12.6 x 14.2 x 3.1	$4,199
True Data Products, Inc. (617) 278-6555	AT-Compatible	80286	MS-DOS 3.1	640K bits-1M byte	360K bits	20M bytes	6, 8, 10 selectable	8	1	1	19.6 x 16.1 x 5.5	$1,539.90
Ultra Corp. (314) 621-4999	The Ultra AT	80286	—	1M byte	1.2M bytes	NA	6, 10 selectable	8	0	1	21.3 x 17.3 x 6.8	Contact vendor
Ultra Tech Distributed (516) 741-3133	GIM A/P	80286	MS-DOS 3.1	512K-1M byte	1.2M bytes	20M bytes	8	7	0	1	—	Contact vendor
	GIM A/5	80286	MS-DOS 3.1	512K bits-1M byte	1.2M bytes	30M bytes	8	8	0	1	21.3 x 17.3 x 6.8	Contact vendor
Unisys Corp. (800) 547-8362	PC IT	80286	MS-DOS 3.2	512K bits	360K bits-1M byte	40M bytes	8	8	2	1	23.0 x 17.0 x 7.0	$3,441.95
	MICRO IT	80286	MS-DOS 3.2	512K bits-3.5M bytes	360K bits	20M-40M bytes	8	5	2	1	15.0 x 15.0 x 5.5	$2,620
United Computer Resources (215) 627-5454	Beltron 386	80386	MS-DOS 3.2	1M bytes	1.2M bytes	NA	12	8	0	0	21.3 x 17.3 x 6.8	$3,000-$6,000
	Beltron AT	80286	MS-DOS 3.2	1M byte	1.2M bytes	NA	10	8	2	1	21.3 x 17.3 x 6.8	$1,295-$2,500
USA Electronics (214) 350-0212	USA AT System	80286	MS-DOS 3.2	1M byte	360K bits	20M bytes	8, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$1,100-$1,900
Victor Technology, Inc. (408) 438-6680	V286	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	0-40M bytes	6, 8 selectable	7	1	1	21.0 x 17.0 x 6.0	Contact vendor
VIPC Computers (800) 222-5657	VIPC 386	80386	MS-DOS, PC-DOS	1M-10M bytes	360K bits-1.2M bytes	0-96M bytes	16	8	1	1	21.3 x 17.3 x 6.8	$2,499
	VIPC AT	80286	MS-DOS, PC-DOS 3.2	1M byte	360K bits-1.2M bytes	0-96M bytes	6, 10 selectable	8	1	1	21.3 x 17.3 x 6.8	$899
Wang Laboratories, Inc. (800) 522-WANG	Wang PC 280	80286	MS-DOS 3.2	640K bits-10.5M bytes	360K bits-1.2M bytes	20M-68M bytes	6, 8, 10 selectable	8	1	1	16.2 x 21.4 x 6.6	Contact vendor
	Wang PC 380	80386	MS-DOS 3.2	2.5M-10.5M bytes	360K bits-1.2M bytes	20M-68M bytes	8, 16 selectable	8	1	1	16.2 x 21.4 x 6.6	Contact vendor
Wells American (803) 796-7800	A Star II series	80286	PC-DOS	512K bits-1M byte	1.2M bytes	0-80M bytes	6, 8, 10, 12 selectable; 14 optional	8	Model 300 only	Model 300 only	21.3 x 17.3 x 6.8	From $1,095
Western Computer (714) 553-1661	Western 286 Tower	80286	MS-DOS 3.2	512K bits-1M byte	1.2M bytes	20M-115M bytes	8, 10 selectable	8	8	1	—	$2,176
	Western AT 286 Turbo	80286	MS-DOS 3.2	512K bits-1M bytes	1.2M bytes	20M-115M bytes	8, 10 selectable	8	1	1	Standard	$1,476
	Western 386 Tower	80386	MS-DOS 3.1	512K bits-2M bytes	1.2M bytes	20M-300M bytes	16	8	10	1	—	$4,195
	Western 386 Advantage	80386	MS-DOS 3.1	512K bits-2M bytes	1.2M bytes	20M-300M bytes	16	8	0	1	Standard	$3,495
Wyse Technology (800) GET-WYSE	Wyse PC 286	80286	MS-DOS	640K bits	1.2M bytes	20M-40M bytes	10	8	1	1	Standard	$1,999-$3,199
	Wyse PC 386 Model 3216	80386	MS-DOS, Unix, Xenix	1M-24M bytes	360K bits-1.2M bytes	40M bytes	8, 16 selectable	6	1	1	Standard	$3,799-$4,999
Zax Corp. (800) 421-0982	ZAX Box-ER	80286	MS-DOS 3.1	640K bits-1M byte	1.2M bytes	20M bytes	6	8	1	1	Standard	$4,695
Zenith Data Systems (800) 842-9000	Z-386	80386	MS-DOS 3.3	1M-3M bytes	360K bits-1.2M bytes	40M-80M bytes	16	6	1	1	21.3 x 17.3 x 6.8	$6,499-$7,499
	Z-248	80286	MS-DOS	512K-640K bits	1.2M bytes	20M-40M bytes	8	5	1	1	21.3 x 17.3 x 6.8	$4,399-$4,999
Z-Nix Co. (213) 493-2516	Z-Nix	80286	MS-DOS 3.2	256K bits	1.2M bytes	30M bytes	6, 12	8	1-4	1-2	Standard	$1,200
Z Technology Systems (415) 588-3386	ZTS 286 Plus	80286	MS-DOS 3.3	1M byte	1.2M bytes	44M bytes	10	8	2	1	Standard	$1,399
	ZTS 386	80386	MS-DOS 3.3	2M bytes	1.2M bytes	44M bytes	16	8	2	1	Standard	$2,495

IBM Personal Computer XT compatibles

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Acer Technologies, Inc. (408) 922-0333	Acer 710	8088	MS-DOS	768K bits	360K bits	0-20M bytes	4.77, 10 selectable	—	—	—	14.2 x 16.2 x 5.0	From $1,795
Advanced Computer Products, Inc. (714) 558-8822	Advanced PC-XT	8088	MS-DOS 3.1	640K bits	360K bits	Optional	4.77	3	1	1	15.0 x 19.0	$625
Advanced Logic Research (716) 581-6770	Advantage EXT Turbo	8088-2	MS-DOS 3.2	640K bits	360K bits	NA	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$1,395
Afton Computer, Inc. (714) 553-1611	XT-Turbo	8088-2	MS-DOS 2.10	640K bits	360K bits	0-40M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$876
Alpha Omega Computer Products, Inc. (813) 345-4422	PC II AD	8088	MS-DOS 3.2	256K bits-1M byte	360K bits-1.2M bytes	User-defined	4.77, 8 selectable	8	2	1	—	$799
American Computer & Peripheral, Inc. (714) 545-2004	American Model 88	8088	MS-DOS	640K bits	360K bits	225M bytes	4.77	8	2	1	19.6 x 16.1 x 5.5	$2,095
American Micro Technology (714) 731-6800	Trans/Pro 7	8088-2	MS-DOS	640K bits	User-defined	User-defined	4.77, 8 selectable	8	0	0	Huggable size	$875
American Research Corp. (800) 423-3877	ARC Turbo Model 10	8088	ARC MS-DOS 3.10	640K bits	360K bits	20M-30M bytes	4.77, 10 selectable	8	1	1	19.6 x 16.1 x 16.1	$1,295
American Semiconductor (813) 961-9444	American Semiconductor Clone	8088-2	MS-DOS	256K bits	360K bits	NA	4.77, 8 selectable	8	0	0	—	Contact vendor
Artificial Technology (415) 490-9344	XT-Turbo	80286	MS-DOS 3.1, 3.2	256K bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$75
Baby Micro, Inc. (303) 790-7719	Baby-XT	8088	MS-DOS	256K bits-640K bits	256K bits	NA	4.77	8	0	1	19.6 x 16.1 x 5.5	$599
	Baby Turbo-XT	8088-2	MS-DOS, PC-DOS	256K bits-640K bits	360K bits	NA	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$699
BAK (617) 756-3320	PC-XT Clone	8088	MS-DOS	640K bits	360K bits	20M bytes	6.77, 8 selectable	8	2	1	19.6 x 16.1 x 5.5	$1,133
Basic Time, Inc. (408) 727-0877	B-Turbo	NEC V.20	MS-DOS	640K bits	360K bits	20M bytes	8.1	8	1	1	19.6 x 16.1 x 5.5	$775
Bentley Computer Products (512) 250-9897	Bentley Model T	8088	MS-DOS 3.2	256K bits	360K bits	NA	4.77, 8	8	0	0	19.6 x 16.1 x 5.5	$395
Bi-Tech Enterprises, Inc. (516) 567-8155	Long Island PC-XT	8088-2	MS-RPC 2.X or higher	640 bits	360K bits-3.5M bytes	10M-100M/170M	4.77, 8 selectable	6	1	1	19.5 x 17.5 x 5.5	$870
Bloatax Systems, Inc. (814) 442-0020	Port XT-System	80286	MS-DOS	640K bits	360K bits	NA	4.77, 8 selectable	4	1	1	13.0 x 13.0 x 7.0	$969
Blue Chip Electronics, Inc. (602) 961-1485	Blue Chip Personal Computer	8088	MS-DOS 3.2	512K bits	360K bits	NA	4.77	6	1	1	15.0 x 15.6 x 5.5	Contact vendor
	Blue Chip Turbo Personal Computer	8088-2	MS-DOS 3.2	512K bits	360K bits	NA	4.77, 8 selectable	6	1	1	15.0 x 15.6 x 5.5	Contact vendor
Bondwell Industrial Co. (415) 490-4300	Bondwell 88	8088	MS-DOS 3.3	640K bits	360K bits	20M bytes	4.77, 8 selectable	5	1	1	15.6 x 14 x 5.7	$1,995
Britek (408) 727-8587	Britek-XT Turbo	8088-2	MS-DOS, PC-DOS	640K bits	360K bits	20M bytes	6.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$1,055
Canon USA, Inc. (516) 488-6700	A-200 II	8086	MS-DOS 2.1	256K bits	360K bits	20M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$1,995
Cantech (415) 791-7091	Cantech Turbo-88	8088-2	MS-DOS 3.1, 3.2	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	2	1	—	$995
Cascade Electronics, Inc. (507) 645-7997	Cascade Electronics XT-Compatible System	8088	MS-DOS 3.2	640k bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	Standard	$699
Century Micro Systems (714) 666-2233	CMS-1100-Series	8088	MS-DOS 3.2	640K bits	360K bits	NA	4.77, 8 selectable	6	0	1	19.0 x 15.0 x 8.0	$850
	CMS-1200	8088	MS-DOS 3.2	256K-640K bits	360K bits	NA	4.77, 8 selectable	6	0	1	19.6 x 16.1 x 5.5	$750
Challenger Computer, Inc. (617) 275-3517	Challenger XT Turbo	8088-2	PC-DOS	256K-640K bits	360K bits	NA	8	8	0	0	Standard	Contact vendor
	XT 186	8086	PC-DOS	256K-640K bits	306K bits	0-20M bytes	8, 10	8	—	—	Standard	Contact vendor
Chicago Computer Connection, Inc. (800) 422-2666	CCC-XTC	8088-2	MS-DOS 2.0 or higher	256K-640K bits	360K bits	30M bytes	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$999
	CCC-Portable-XT	—	MS-DOS	256K-640K bits	360K bits	NA	4.77, 8 selectable	7	0	1	—	$999
Clone Computers (214) 637-5400	Standard Clone	8088	MS-DOS 3.2	640K bits	360K bits	20M-80M bytes	4.77	8	1	1	19.6 x 16.1 x 5.5	$699
	Turbo Clone	8088-2	MS-DOS 3.2	640K bits	360K bits	20M-80M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$799
Clone Factory (213) 477-0447	Turbo-XT-Clone	V20	MS-DOS 3.2	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	19.25 x 17.25 x 5.75	$804
Clone Technologies, Inc. (913) 469-0400	Clone Turbo-XT	8088-2	MS-DOS 3.2	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$395
Columbia Data Products, Inc. (305) 774-1111	Columbia 1600	8088	MS-DOS 2.11	640K bits	360K bits	10M bytes	4.77	8	2	1	19.6 x 16.1 x 5.5	$975
Comark Corp. (312) 351-9700	TCS 5000 A Turbo	8088-2	MS-DOS 3.1	640K bits	360K bits	20M-130M bytes	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	Contact vendor
Commodore Business Machines, Inc. (215) 431-9100	Commodore PC-10 series	8088	MS-DOS 3.2	512K-640K bits	360K-720K bits	40M bytes	4.77	5	1	1	19 x 14 x 5	$999-$1,199
Compaq Computer Corp. (713) 370-0670	Deskpro PC	8086	MS-DOS, Basic 2.0, 3.0	256K-640K bits	360K bits	NA	—	7	—	1	19.8 x 16.5 x 6.4	Contact vendor
Competitive Computer Components (800) 443-9834	Competitive Computer Components XT-Turbo	8088-2	MS-DOS	640K bits	360K bits	NA	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	From $577
	Competitive Computer Components-Enhanced XT-Turbo	8088-2	MS-DOS	640K bits	360K bits	—	4.77, 6 selectable	8	1	2	19.6 x 16.1 x 5.5	From $988
Complete Computer Systems (214) 539-8355	CCS-XT	8088	MS-DOS 3.1	640K bits	360K bits	NA	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$799
Compstar, Inc. (818) 845-3385	Compstar Turbo-XT	D 70108-8	MS-DOS 3.2	640K bits-1M byte	360K bits	20M-80M bytes	4.77, 8 selectable	8	2	1	19.6 x 16.1 x 5.5	$899
	Compstar Turbo-80	—	MS-DOS, Unix System V	1M byte	1.2M bytes	40M bytes	12	8	1	1	19.6 x 16.1 x 5.5	$2,499
Compudd (512) 250-1489	Standard 88	8088	MS-DOS 2.1 or higher	256K bits	360K bits	NA	6.77	8	0	0	19.6 x 16.1 x 5.5	$395
Compucorp (213) 306-2626	Connection 8088-Turbo	8088	MS-DOS 3.2	640K bits	360K bits	20M-30M bytes	6, 8 selectable	5	2	2	19.6 x 16.1 x 5.5	Contact vendor
Computer Age, Inc. (203) 724-5100	Computech Turbo XT	8088-2	MS-DOS 3.1	640K bits	360K bits	NA	4.77,8 selectable	8	0	1	19.6 x 16.1 x 5.5	$895
Computer Creations, Inc. (813) 836-3787	Professional-XT	8088-2	MS-DOS	640K bits	360K bits	NA	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$579
Computerland Corp. (415) 639-2025	BC-88	8088	MS-DOS 3.2	256K bits	NA	NA	4.77, 8 selectable	8	1	1	16.25 x 16.25 x 6.25	$1,495
Computer Library (415) 633-6784	XT-Turbo System	8088	MS-DOS 3.1	256K-640K bits	360K bits	NA	4.77, 8 selectable	8	0	0	19.6 x 16.1 x 5.5	$399
Computer Mail Order (800) 233-8950	CMO PC Too	8088-2	MS-DOS 2.1	640K bits	360K bits	20M bytes	4.77	8	0	0	—	$999
	CMO PC Too XT-Turbo	8088-2	MS-DOS 2.1	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	0	0	—	$1,049
Computer Products United (800) 824-2938	CPU XT-Turbo	V20	MS-DOS 2.1	640K bits	—	20M bytes	8	8	1	1	19.3 x 16.13 x 5.8	$1,090

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors.

Lines shift

CONTINUED FROM PAGE S11

talked to [IBM]," Bobzin says, "and they've said it's not their policy to say anything. If they decide we're infringing, we'll hear from them. If we're OK, we'll never hear from them. We've had a product on the market since 1984, and we've never heard from them."

Bobzin emphasizes the pervasiveness of Phoenix's ROM BIOS. "We have close to 150 licensees using our BIOS, ranging in size from Tandy to guys in a garage knocking out clones. In fact, we believe there are more machines with Phoenix's BIOS than Compaq's," he says.

Bobzin says his customers can, to some extent, provide better performance at a lower price than IBM. "A 386 system with the Phoenix BIOS may well outperform, and be cheaper than, a PS/2 Model 60 [with a 286 CPU] just because it has a 386. IBM has done a lot of investing in coordinating electrical and mechanical design to produce a pleasing package, and some of that you can't do at the AT-level technology. But our customers want price and performance, and many can provide that better than IBM."

How sturdy are the defenses?

The overall performance of any computer system is determined not only by the speed of the CPU but also by the speed of the other components and how fast these components can communicate with each other. In the new IBM computers, intercomponent communications are performed by IBM's new electronic device called the Micro Channel.

Although IBM is patenting this device, there is evidence the company will permit clone makers to use this new technology. According to Colony, an unnamed source at IBM told him that the company does not plan to sue anyone that uses it, although the company may change its mind.

Clone makers are looking closely at IBM's historical policy of establishing cross-licensing agreements with other computer vendors. These agreements usually permit the vendor to use IBM's patents in exchange for reasonable compensation or sometimes just for the right to use the vendor's patents.

IBM's most recent statement on this policy is as follows: "IBM's practice regarding protection of intellectual property has not changed. IBM continues its licensing practice in regard to utility patents as it has in the past. IBM will license its utility patents on a nondiscriminatory basis under reasonable terms and conditions. IBM also continues its practice not to license design patents, copyrighted microcode and other copyrighted material."

Whether this will mean the Micro Channel will be freely available to competitors is still very much in doubt. IBM spokesman Scott Brooks says, "The Micro Channel comprises many different elements, which are protected by intellectual property law. It's really a whole Micro Channel architecture covered by trade secrets, copyrights and so forth."

According to Phoenix's Bobzin, IBM's relicensing policy will not solve the clone makers' problems for a long time. "IBM has a practice of relicensing, so once they have a legal patent, we can expect them to license it to anyone who uses it in a legal and legitimate fashion. The problem is that at this time IBM has simply applied

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Computer Systems (313) 779-8700	PC/88	8088-1	MS-DOS 3.1	640K bits	360K bits	NA	4.77, 8 selectable	7	1	1	19.6 x 16.1 x 5.5	$750
	Industrial PC/88	8088-1	MS-DOS 3.1	640K bits	360K bits	NA	4.77, 8 selectable	7	1	1	19.6 x 16.1 x 5.5	$1,500
Continental Peripheral Unlimited (818) 282-3121	Super IXT	V20	MS-DOS 3.2	640K bits	360K bits	20M bytes	8	8	0	1	19.6 x 16.1 x 5.5	$1,100
Data Dynamics (800) 351-7832	Data Dynamics-XT Turbo	—	MS-DOS 3.2	640K bits	360K bits	NA	—	8	0	1	19.6 x 16.1 x 5.5	$575
Data-Lite Systems (805) 584-9104	DL-Turbo Plus	8088-2	MS-DOS 3.2	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$850
Datavue Technical Systems (404) 564-5780	Super Micro 150	8086	MS-DOS 3.2	640K bits	360K bits	20M-70M bytes	150	2	1	1	19.6 x 16.1 x 5.5	$1,260
	Series-30	8086	MS-DOS 3.2	640K bits	360K bits	20M-70M bytes	10	7	1	1	19.6 x 16.1 x 5.5	$1,795
Daytapro Electronics (312) 394-0555	Mega-4000	8088-2	MS-DOS 3.2	640K bits	360K bits	NA	4.77, 7.89 selectable	8	0	1	19.6 x 16.1 x 5.5	$799
	DTK	8088-1	MS-DOS 3.2	640K bits	360K bits	NA	10	8	0	1	19.6 x 16.1 x 5.5	$899
Eastern Enterprises, Inc. (213) 725-3688	Enterprise XT-Plus	8088	MS-DOS 3.2	640K	360K bits	20M-82M bytes	6, 8 selectable	8	1	1	Standard	Contact vendor
80 Microcomputer Service, Inc. (518) 393-2494	80 Micro 88+	8088-2	MS-DOS 3.2, GW-Basic	640K bits	360K bits	20M bytes	5, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$1,495
Epson America, Inc. (213) 539-9140	Equity III	8088	MS-DOS 3.1	640K bits	360K bits	NA	4.77, 7.16 selectable	5	1	1	14.5 x 16.0 x 5.7	$1,295
	Equity I Plus	8088	MS-DOS 3.2	640K bits	360K bits	NA	4.77, 10 selectable	5	1	1	14.4 x 14.8 x 5.7	$1,095
Five Star Computers (800) 752-5555	Five Star Express	V30	MS-DOS 3.1, 3.2	640K bits	720K bits	NA	4.77, 9.5 selectable	2	1	1	—	$1,295
	Five Star XL	V20	MS-DOS 3.1, 3.2	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$1,195
47th Street Photo (800) 221-7774	Maximum Turbo-XT	8088-2	MS-DOS 3.2	256K bits	360K bits	20M bytes	4.77, 8 selectable	8	0	0	19.6 x 16.1 x 5.5	$895
GEMS Computers (408) 988-0161	GEMS Mach-III-2	V20	MS-DOS 3.1	640K bits	360K bits	NA	6.77, 8 selectable	8	1	2	19.6 x 16.1 x 5.5	$698
Grid System Corp. (415) 961-4800	Grid Case Plus	8086	MS-DOS 2.0	640K bits	720K bits	10M bytes	4.77	0	1	1	15.0 x 11.5 x 2.0	From $2,750
Gulfstream Micro Systems, Inc. (305) 994-6500	GMS PC/88-2	8088	MS-DOS 3.2	640K bits	360K bits	10M-140M bytes	4.77, 8 selectable	8	0	0	19.6 x 16.1 x 5.5	$949
Heath Co. (616) 982-3200	HS-158-W	8088-2	MS-DOS 3.2	256K-640K bits	360K bits	20M bytes	4.77, 8 selectable	5	1	1	16.0 x 16.5	$1,499
Honeywell Bull, Inc. (617) 895-6000	PC XP	8088-2	MS-DOS 2.1	256K-640K bits	360K-720K bits	0-20M bytes	4.77, 8 selectable	8	1	1	19.5 x 15.5 x 5.5	$2,165
	PC EP	8088-2	MS-DOS 2.1	256K-640K bits	360K-720K bits	10M bytes	4.77, 8 selectable	4	0	1	16.0 x 15.6 x 4.9	$1,450
Industrial Computer Products (617) 356-7500	Pro PC XT Turbo	8088	MS-DOS 3.2	640K bits	360K bits	20M-170M bits	4.77, 8 selectable	8	1-8	1	—	$895-$2,500
Information & Technology Services, Inc. (800) 642-2395	ITS Turbo II XT	V20	MS-DOS 3.1	640K bits	360K bits	20M-30M bytes	4.77, 7.33 selectable	8	0	1	—	$849
Innovative Technology Ltd. (800) 253-4001	Affordable XT	8088	Any version MS-DOS	640K bits	360K bits-1.2M bytes	10M-60M bytes	6, 8 selectable	8	0	0	19.6 x 16.1 x 5.5	From $425
Intelligent Data Systems, Inc. (213) 633-5504	PC-88	8088-2	MS-DOS	640K bits	360K-720K bits	80M-180M bytes	6, 8 selectable	8	1	1	20.0 x 16.0 x 6.0	$765
Intelligent Micro Systems Corp. (800) 624-4031	IMS-88	8088	MS-DOS 3.2	256K-640K bits	360K bits	20M-70M bytes	8	8	0	0	19.0 x 16.0	From $549
Ishvar Technology (209) 561-3139	PC-FX	8087-2	MS-DOS 3.1, 3.2	640K bits	360K bits	20M-30M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$665
Ivy Microcomputer Corp. (617) 853-6914	DT-10	8088	MS-DOS 3.1	256K-512K bits	360K bits	10M-80M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$599
Kaypro Corp. (800) 4KAYPRO	Kaypro PC-30	V20	MS-DOS	768K bits-2M bytes	360K bits	30M bytes	4.77, 8 selectable	9	1	1	19.5 x 16.0 x 5.5	$1,695
Leading Edge Hardware Products, Inc. (617) 828-8150	Model D	8088-2	MS-DOS	512K-768K bits	—	30M bytes	4.77, 7.16 selectable	4	1	1	—	$1,075
	Model D Leading Edge Infinite Memory System	80286	MS-DOS	—	—	20M bytes	6, 8, 10 selectable	4	1	1	—	$1,995
Lolir Corp. (214) 234-8032	Lolir 8088	8088	MS-DOS 3.1	640K bits	360K bits	20M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$925
Lucky Computers (214) 690-6110	Jumbo XT	V20	MS-DOS	640K bits	360K bits	20M-130M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$725
Magitronic Technology, Inc. (718) 706-7670	XT System 800	8088	MS-DOS	256K-640K bits	360K bits-4M bytes	0-30M bytes	4.77	8	0	1	19.6 x 16.1 x 5.5	From $529
Main Street Computer Products, Inc. (617) 393-3397	MS T1201	8088-2	MS-DOS, PC-DOS	640K bits	360K bits	20M bytes	4.77, 8 selectable	7	2	1	19.6 x 16.1 x 5.5	$1,495
	MS T1000	8088-2	MS-DOS, PC-DOS	640K bits	360K bits	80M bytes	4.77, 8 selectable	7	2	1	19.6 x 16.1 x 5.5	From $995
Markham International Ltd. (617) 769-7272	Markham International XT	—	MS-DOS 3.2	640K bits	360K bits	User-defined	4.77, 8 selectable	8	2	1	19.6 x 16.1 x 5.5	$628
May Computers Corp. (714) 897-2037	Mega 4000	8088	MS-DOS 3.1, 3.2	640K bits-1M byte	360K bits	80M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$799
Microcomputer Concepts (800) 772-3914	XT Compatible System	8088-2	MS-DOS	640K bits	360K bits	NA	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$799
Micro Express (714) 662-1973	ME V20	V20	MS-DOS 3.2	640K bits	360K bits-1.2M bytes	20M-80M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	From $839
Micropeach, Inc. (714) 995-3600	Peach 1000 Turbo	8088-2	MS-DOS, PC-DOS	640K bits	360K bits	NA	4.77, 8 selectable	8	0	0	19.6 x 16.1 x 5.5	Contact vendor
	Peach 1000	8088	MS-DOS, PC-DOS	640K bits	360K bits	NA	4.77	8	0	0	19.6 x 16.1 x 5.5	Contact vendor
Micro Smart, Inc. (617) 872-9090	Turbo M	8088-2	MS-DOS	640K bits	360K bits	NA	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$699.95
Microstar (312) 968-3323	Microstar XT	8088	MS-DOS	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$999
Micro Systems Engineering Corp. (408) 257-4249	Turbo XT	8088-2	MS-DOS 3.1, 3.2, 3.3	640K bits	360K bits	20M-30M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$575
Mitac International (800) 321-8344	MPC16OT	8088-2	MS-DOS 3.2	768K bits	360K bits	30M-40Mbytes	4.77, 8 selectable	5	0	0	16.1 x 13.9 x 5.4	$599
The Mom Corp. 800-241-1170	Smartstation XT	8088	MS-DOS 3.2	256K-640K bits	360K bits	0-300M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	Contact vendor
NCR Corp. (513) 445-7478	The PC6	8088	MS-DOS	256K-640K bits	360K bits	20M-30M bytes	4.77, 8 selectable	8	1	1	19.5 x 15.0 x 5.5	From $1,775
NEC Home Electronics (USA), Inc. (800) 447-4700	Multispeed	V30	MS-DOS 2.1, 3.2	640K bits	720K bits	NA	4.77, 9.54 selectable	1	1	1	13.6 x 12.4 x 3.1	$1,995
Nippon Electronic Technology Corp. (415) 490-4650	NET V20	V20	MS-DOS 3.2	640K bits	360K bits	30M bytes	4.77, 8 selectable	8	1	1	—	Contact vendor
Norrell Corp. (213) 451-5258	XT Compatible	V20	MS-DOS	640K bits	360K bits	20M-33M bytes	10	8	1	2	19.6 x 16.1 x 5.5	From $750

for a patent, and until they actually have the patent, which may take 18 months, no relicensing will take place," he says.

The operating system

When IBM first announced the Personal Computer in 1981, the operating system marketplace became very crowded. IBM's operating system of choice was PC-DOS, its version of Microsoft Corp.'s MS-DOS, but many other operating systems, such as the University of California at San Diego's P-system and Digital Research's CP/M-86, were also vying for attention. However, the industry demanded a standard, and since MS-DOS and PC-DOS were available for IBM computers and PC-compatible computers, a consensus developed among vendors, users and third-party software developers to make that operating system the standard.

But now the forces that led to that consensus are beginning to weaken dramatically. IBM's decision to write its own proprietary portions of its OS/2 operating system will force clone manufacturers to turn to non-IBM operating systems, and once that door is opened, a number of software houses will rush to fill the need.

Even IBM seems to be turning to multiple-vendor operating system solutions, at least for now. "It was interesting that we were given the opportunity by IBM to participate in [its PS/2] announcement," says Theresa Myers, president of Santa Monica, Calif.-based Quarterdeck Office Systems, the developer of Desqview.

Desqview is not an operating system, but it works with the operating system and contains features that, while normally found in some operating systems, are not in MS-DOS. One of these is multitasking, which permits a computer to run several different tasks at once. Although multitasking has been available on minicomputers and mainframes for years, its availability has been quite limited on micros.

Although Microsoft has announced a multitasking capability for January 1988 release, the company has a reputation for being late with software deliveries. "One of the reasons IBM had us there [at the announcement], is that we're the only solution right now," Myers says.

Presentation Manager

Further complicating the current situation is the absence of specifications for IBM's OS/2 Presentation Manager, which will delay the availability of Presentation Manager-based applications. Although largely based on Microsoft Windows, Presentation Manager will nonetheless lack Windows compatibility. "Many people believe that IBM announced Windows as the presentation interface, but that's not true," Myers claims. "It's supposed to have an Applications Programming Interface, which is not yet defined, and a video display interface (VDI), which is definitely not a Windows VDI."

What this means in practical terms is that third-party software developers must be prepared to change their code when the exact specifications are announced, probably sometime in the fall. "You're talking way into 1988 or 1989 before you'll have Presentation Manager and programs associated with it," Myers predicts.

The promise of super-fast, super-functional versions of programs like Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Dbase II that run on 80386 systems with high-performance buses

COMPANY	PRODUCT	MICROPROCESSOR	OPERATING SYSTEM	RAM (STANDARD - POTENTIAL)	FLOPPY-DISK STORAGE (STANDARD - POTENTIAL)	HARD-DISK STORAGE (STANDARD - POTENTIAL)	CLOCK SPEED (MHZ)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	FOOTPRINT (INCHES) (LENGTH, DEPTH, HEIGHT)	PRICE
Olivetti USA (201) 526-8200	M24	8086	MS-DOS	640K bits	360K-720K bits	10M-20M bytes	8	7	1	1	14.8 x 14.4 x 6.2	$2,250
Orientec of America (213) 268-4001	Orientec XT Series	8088-1, 8088-2	MS-DOS	640K bits	360K bits	20M-30M bytes	8, 10 selectable	8	1	1	19.6 x 16.1 x 5.5	$630-$650
Packard Bell Electronics, Inc. (800) 521-7979	Packard Bell ZX88 Personal Business Computer	V40	MS-DOS, Basic 3.2	640K bits	360K bits	20M bytes	5, 8 selectable	4	1	1	14.45 x 15.35 x 5.32	$999
Panasonic Industrial Co. (201) 348-7000	FX-600	8086-2	MS-DOS 3.1	256K-640K bits	360K bits	20M bytes	4.77, 7.16 selectable	6	0	1	17.5 x 16.0 x 6.0	From $1,099
PC America (805) 392-0731	System/1	8088-2	MS-DOS 3.1	256K-640K bits	360K bits	20M-70M bytes	4.77, 8 selectable	8	0	1	Standard	$695
PC Buyers Group (800) 822-8937	10 Plus	8088	MS-DOS	640K bits	360K bits	NA	4.77, 10 selectable	8	0	1	19.6 x 16.1 x 5.5	$649
	XT Turbo Plus	8088-2	MS-DOS	640K bits	360K bits	NA	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$499
PC Pro Systems, Inc. (800) 451-5279	Turbo XT	8088-2	All MS-DOS, PC-DOS	640K bits	360K bits	NA	4.77, 8 selectable	—	1	2	—	$699
PC's Limited (800) 426-5150	PC's Limited Turbo PC	8088-2	MS-DOS	640K bits	360K bits	20M-40M bytes	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	From $764
Pine Computer, Inc. (818) 575-1882	Pinecom XT	8088-2	MS-DOS 3.1	256K-640K bits	360K bits	NA	4.77, 8 selectable	8	0	1	19.6 x 16.1 x 5.5	$499
PMA (415) 968-5755	PMA XT Turbo	8088-2	MS-DOS, PC-DOS 2.0 or higher	640K bits	360K bits-1.2M bytes	User-defined	4.77, 8.1 selectable	8	User-defined	User-defined	19.6 x 16.1 x 5.5	Contact vendor
Princeton Computer Products (609) 799-4440	XT System IV	8088-2	MS-DOS, PC-DOS 3.1, 3.2	640K bits	360K bits	20M bytes	8	8	1	2	19.0 x 16.0 x 6.5	$1,299
Proto PC, Inc. (612) 644-4660	Proto X16	8186	MS-DOS	512K bits-1M byte	—	—	—	—	—	—	—	Contact vendor
QIC Research, Inc. (408) 942-8888	QIC Turbo XT	8088	MS-DOS,PC-DOS	256K-640K bits	360K bits	NA	4.77, 8 selectable	8	0	0	19.6 x 16.1 x 5.5	$399
Romanicus Corp. (213) 327-9300	PCXT Color & Monochrome	8088	MS-DOS 3.2, Xenix	640K bits	360K bits	20M bytes	4.77	8	0	1	19.6 x 16.1 x 5.5	$880-$1,160
Samsom Computer International Co. (818) 284-1680	XT Compatible	8088, 80286	MS-DOS 3.1	640K bits	360K bits	20M-30M bytes	4.66	8	1	1	19.6 x 16.1 x 5.5	$699
Sanyo Business Systems Corp. (201) 440-9300	MBC 675	8088	MS-DOS 2.11	256K bits	360K bits	NA	4.77	3	1	1	18.3 x 12.0 x 7.8	$1,199
Sefco Computer Products (213) 205-0828	XT Turbo	8088-1 or V20	MS-DOS 2.0, 3.2	1M byte	360K bits-1.2M bytes	—	4.77, 10 selectable	8	1	1	19.6 x 16.1 x 5.5	$600-$700
SF Micro (415) 929-1505	SF Turbo XT Model 4000	8088-2	MS-DOS 3.1	640K bits	360K bits	20M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$895
Sharp Electronics Corp. (800) 526-0264	PC-7100	8086-2	MS-DOS 2.11	320K bits	360K bits	20M bytes	7.37	2	1	1	16.0 x 6.3 x 8.5	$2,795
Suntronics, Inc. (213) 644-1140	Sun ST	8088-2	PC-DOS	640K bits	720K bits	NA	4.77, 8 selectable	8	0	1	19.5 x 17.5 x 6.0	From $695
Supreme Techtronics Corp. (408) 437-1306	STC Escort PC 1988	8088	MS-DOS	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$575-$878
Supreme USA, Inc. (714) 739-0106	Turbo Plus	8088-2	MS-DOS	640K bits	360K bits	20M-140M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$799-$1,295
Talbott Development Corp. (702) 795-8815	XT Comet	8088	MS-DOS, PC-DOS	640K bits-5M bytes	360K bits	20M-42M bytes	4.77, 8 selectable	8	2	2	19.5 x 16.0 x 5.5	$732-$1,602
Tandon Corp. (818) 994-6644	PCX-10	8088	MS-DOS 3.1	256K-640K bits	360K bits	10M bytes	4.7	6	1	1	Standard	$1,199
	PCX-20	8088	MS-DOS 3.1	256K-640K bits	360K bits	20M bytes	4.7	6	1	1	Standard	$1,399
Tandy Corp. (817) 878-4969	Tandy 3000 HL	80286	MS-DOS 3.2	512K bits-1M byte	360K bits	20M-40M bytes	4, 8 selectable	7	0	1	17.0 x 15.5 x 6.13	$1,699-$3,499
Tatung Co. of America, Inc. (213) 979-7055	TCS-5000	8088-2	MS-DOS	256K-640K bits	360K bits	NA	4.77, 8 selectable	8	0	0	17.0 x 14.9 x 5.0	$749
Technoland, Inc. (800) 222-3978	Technoland X-Turbo	8088-2	MS-DOS	640K bits	360K bits	NA	8	8	0	0	Standard	$575
Telex Computer Products, Inc. (918) 627-1111	1260 Intelligent Workstation	80186	MS-DOS 3.1	256K-640K bits	360K bits	0-40M bytes	8	6	1	1	—	Contact vendor
Texas Instruments, Inc. (800) 232-3200	Model 945 Workstation	8088	MS-DOS 3.2, TI 931 terminal emulator	256K bits	360K bits	—	4.77, 8 selectable	5	1	1	17.32 x 16.54 x 6.2	$1,495
True Data Products, Inc. (617) 276-6555	XT-Turbo System	8088	MS-DOS 3.1	640K bits	360K bits	20M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$1,039
Ultra Corp. (314) 621-4999	The Ultra Turbo Ten	8088-2	MS-DOS	256K-640K bits	360K bits	NA	4.77, 10 selectable	8	0	1	19.6 x 16.1 x 5	Contact vendor
Ultra Tech Distributed (516) 741-3133	G.I.M. X/2	8088	MS-DOS 3.1	256K-640K bits	360K bits	20M bytes	8	8	0	1	19.6 x 16.1 x 5.5	Contact vendor
	G.I.M. X/P6	8088	MS-DOS 3.1	640K bits	360K bits	20M bytes	8	7	0	1	—	Contact vendor
Unisys Corp. (800) 547-8362	PC HT	8088	MS-DOS 3.2	256K-640K bits	360K bits-1.2M bytes	20M bytes	7.16	6	1	0	18.0 x 16.5 x 6.0	$2,595
United Computer Resources (215) 627-5454	Beltron XT	8088-2	MS-DOS 3.2	640K bits	360K bits	20M bytes	8	8	1	1	19.6 x 16.1 x 5.5	$795-$1,200
USA Electronics (214) 350-0212	Super Turbo XT	8088-2	MS-DOS 3.2	640K	360K bits	20M bytes	8	8	1	2	19.6 x 16.1 x 5.5	$649-$1,800
USA Micro, Inc. (800) 654-5426	Laser Turbo XT	8088-2	MS-DOS 3.2	256K-640K bits	360K bits	20M bytes	4.77, 8 selectable	8	—	1	—	$495-$1,245
US Caltron Corp. (818) 333-8803	ASI 800T	8088-1	MS-DOS 2.0 or higher	256K-640K bits	360K bits	0-40M bytes	4.77, 10 selectable	8	0	0	19.6 x 16.1 x 5.5	Contact vendor
	ASI 100E	8088	MS-DOS 2.0 or higher	256K-640K bits	360K bits	0-40M bytes	4.77	8	0	0	19.6 x 16.1 x 5.5	Contact vendor
Vendex Pacific, Inc. (516) 482-4255	Vendex Turbo 888 XT	8088-2	MS-DOS	512K-768K bits	360K bits	NA	4.77, 8 selectable	7	1	1	Standard	$995-$1,295
Victor Technologies, Inc. (408) 438-6680	VPC II	8086	MS-DOS 3.2	640K bits	360K bits	30M bytes	4.77	5	1	1	16.5 x 14.5 x 5.5	Contact vendor
	Champion	8086	MS-DOS 3.1	640K bits	360K bits	NA	4.77	5	1	1	—	$799
Video Technology Computers, Inc. (312) 272-6760	Laser Compact XT	8088-2	MS-DOS, GW-Basic	512K-640K bits	360K bits	NA	4.77, 10 selectable	1	1	1	14.5 x 12.5 x 3.8	$695
VIPC Computers (800) 222-5657	VIPC XT	8088-2	MS-DOS, PC-DOS	256K-640K bits	360K bits	30M bytes	4.77, 8 selectable	8	1	1	19.6 x 16.1 x 5.5	$599
Western Computer (714) 553-1661	Western XT Turbo	8088-2	PC-DOS 2.1, MS-DOS	640K bits	360K bits	20M-115M bytes	4.77, 8 selectable	8	1	1	Standard	$876
Wyse Technology, Inc. (800) GET-WYSE	Wyse PC Plus WY1400	8088	MS-DOS	256K-640K bits	360K bits	10M-20M bytes	4.77, 9.54 selectable	2	2	1	Standard	$1,199-$1,899
Zenith Data Systems (800) 842-9000	Z-148 Desktop System	8088	MS-DOS	512K-640K bits	360K bits	0-20M bytes	4.77, 8 selectable	1	1	1	16.0 x 16.1 x 4.8	$1,299-$1,899
	Z-181 Portable	80C88	MS-DOS	640K bits	720K bits	NA	4.77, 8 selectable	0	1	1	13.4 x 11.6 x 13.1	$2,399
	Z-159 Desktop Series	8088	MS-DOS	512K bits-1.2M bytes	360K bits	0-20M bytes	8	5	1	1	—	$1,449-$2,399
	Z-183 Portable	80C88	MS-DOS	640K bits-1.2M bytes	720K bits	10M bytes	4.77, 8 selectable	1	1	1	13.4 x 13.9 x 3.45	$3,499
Z Nix Co. (213) 493-2516	Z-NIX	8088	MS-DOS 3.2	256K-640K bits	360K bits	20M bytes	6.77, 8 selectable	8	1-4	1-2	Standard	$700
Z Technology Systems (415) 588-3386	ZTS XT Turbo	8088	MS-DOS 3.1, 3.3	640K bits	360K bits	20M bytes	4.77, 8 selectable	9	2	2	Standard	$595

like the Micro Channel must be tempered by the reality of developers' ability to deliver.

Even though most software is currently written in machine-independent languages such as C, large software systems must often be tuned to take advantage of specific hardware and operating system characteristics. This can represent a large part of the development effort.

Most application software available today is tuned for high performance on ordinary PC- and AT-class machines. Tuning software for optimum performance on 386-based machines will require major revisions. Further revisions will be necessary to exploit the Micro Channel, the new versions of MS-DOS and PC-DOS and the Presentation Manager.

Keeping up with IBM's new hardware and operating system is not the only challenge confronting software developers. Consider the following:

- PCs, XTs and ATs, as well as clones and compatibles, make up a huge installed base. Users of these machines are going to demand the same functional improvements to application software that users of the new machines have, and independent software developers that make money based on the amount of software they sell are going to want to cater to the greatest pool of users.
- Application software developers that tune their software to take greatest advantage of the Micro Channel will be shutting out a huge market of clone makers. There will be a great deal of market pressure to provide equivalent performance on software running on clone machines.
- IBM's versions of the operating system and Presentation Manager will be different from those running on clones and compatibles. Developers will have to adapt their software to run on both.

Microcomputer software developers are learning what their mainframe counterparts already know: Simply developing new versions of software is no longer sufficient. Rather, they must devote resources to producing multiple versions of the same software to run on different combinations of hardware and software.

Undoubtedly, the industry will eventually reach a consensus on hardware and software standards. But what those standards will be remains unclear. "IBM's new series of personal computers has been recognized as a significant technical improvement," says Daniel Gross of New York-based Magnetic Press, Inc., "but no one is calling it a breakthrough. The day after the announcement, IBM stock barely moved on the New York Stock Exchange.

"Clearly the new computers will not spark another revolution," Gross says, "but they do indicate the beginning of a major reform in IBM's strategy and in the personal computer business as a whole. No major player in the industry is holding back any major announcements. Apple has unveiled the new Macintosh line. Microsoft and IBM have made their strategies public. The ball is now in the court of the information industry executives."

In fact, the number of opportunities for everyone — IBM, PC compatible hardware vendors, clone makers, operating system software developers and application software developers — will be enormous. In 1981, few people had heard of companies like Compaq, Lotus and Microsoft. Those who play their hands wisely today will become the Compaqs, Lotuses and Microsofts of the 1990s. •

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HARD TALK

James Connolly

Hypers put in hot spot

One way to tell how hot a segment of the computer industry might be is to see how hard the marketing types hit it. Supercomputing must be very hot because the smiling, smooth, snake-oil types have drifted out of the comparatively mature microcomputer field to talk about parallel computing, data flow and number crunching.

Evidence that supercomputing has crossed the threshold into "hot" was seen at the International Conference on Supercomputing held in Santa Clara, Calif., earlier this month. That conference and the accompanying World Supercomputer Exhibition provided a wonderful opportunity for thousands of supercomputer users to get together for brain-picking and view varied supercomputers and minisupercomputers at a single site.

That idea worked well. The supercomputer industry has succeeded beyond anyone's reasonable expectations and has spawned a spin-off field of minisupercomputer makers that

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Ryder ready to roll pilot project

System/36s bound for 126 U.S, Canadian offices to handle DP, tie sites

BY JAMES CONNOLLY
CW STAFF

MIAMI — Six years of planning and 850,000 lines of programming are set to bear fruit in the coming months as one of the largest-ever IBM System/36 projects moves into the pilot phase prior to a 126-system rollout early next year.

With that rollout, Ryder Truck Rental, Inc. will wrap up a project — tied to corporate growth plans — born before the System/36 was announced and spanning two generations of the often-controversial minicomputers — a product line that Ryder is confident will serve it well.

The System/36s are slated to handle all of the DP needs — including accounting, personnel and sales applications — of 126 Ryder district offices in the U.S. and Canada. In addition, the minicomputers will exchange information on a polled basis with Ryder's IBM 3084 and Amdahl Corp. 5860 mainframes.

Complex operation

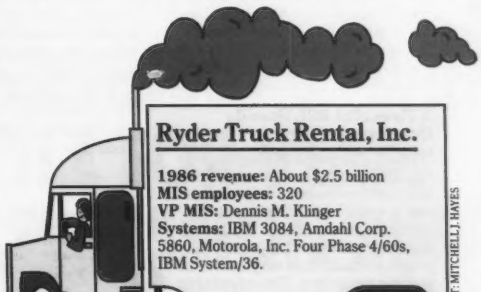
"I don't know of anyone who is doing anything bigger on the System/36, given the size and complexity of the application," says Dennis M. Klinger, vice-president for MIS at Ryder Truck Rental, a $2.5-billion division of Ryder System, Inc.

"The net result I hope to achieve is to accommodate many of the new products we've added since the installation of the old system, while keeping our costs from going up. When we built the old system, we had maybe four or five products. Today, we have 20 or 25," Klinger says.

When asked about other customers' criticism of the System/36, particularly in office automation, and questions about IBM's commitment to the system after the 1986 debut of the mid-range IBM 9370, Klinger notes the System/36 won Ryder's benchmark competition. He also emphasizes that Ryder's system will be oriented toward data processing rather than the office, and that Ryder has no desire to move IBM 370 applications — and support personnel — into its districts for a 9370.

"We are happy with the System/36, and I feel we will be happier as time goes on," says Klinger, who admits he has been kept informed of some IBM mid-range plans but will not publicly speculate about product directions. He notes that MIS had the backing of Ryder planners who were willing to look years ahead rather than at the short term.

Ryder's district automation began in 1978 with installation of minicomputers sold by Four Phase Systems, Inc., which was later acquired by Motorola, Inc.



Klinger stresses that the Four Phase processors ran well, but Ryder's growth in an era of trucking deregulation led to a search for long-term solutions and a request for proposals in 1981.

"Three or four companies, including Motorola, submitted proposals, but we decided the technology we wanted to base our future on wasn't there yet," Klinger says. Ryder postponed major acquisitions, upgraded some Four Phase systems and augmented the minicomputers

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Apollo hits high-end 3-D arena

BY NINAMARY BUBA MAGINNIS
CW STAFF

The Apollo Computer, Inc. DN590 Turbo, a high-performance three-dimensional graphics workstation, has given beta-test user TRW, Inc. top performance, according to a manager with that company.

"This is the best one in their line. We have not had a failure yet," says Tom Heim, manager of TRW's engineering and computer center. TRW's electronic and defense sector, based in Redondo Beach, Calif., has had the DN590 Turbo workstations for six weeks, Heim says.

Heim made his observations on the DN590 while one of Apollo's competitors answered Apollo's performance claims for the workstation introduced this month [CW, May 11].

"Its graphics performance is

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Inside

- Siemens enhances its IBM-compatible mainframe-class laser printers. Page 61.
- Star Technologies offers an interface to link its array processors to DEC's VAXBI. Page 62.
- EMC introduces an intelligent disk controller for Wang computers. Page 63.

Ready to roll

CONTINUED FROM PAGE 57

with personal computers.

The districts act as independent businesses, managing more than the daily rental of bright yellow trucks for household moving. They handle long-term commercial truck leases, packing and moving services, freight hauling, leasing of drivers, vehicle maintenance and new car transportation.

Each district brings in $25 million to $50 million in revenue and has 25 to 30 computer users — who have enough computer experience to make the System/36 transition easier than a first-computer installation. Other Ryder divisions are active in public transit, school bus services, aerospace and insurance.

By 1983, technology demanded another look, Klinger says. In this case, approximately four vendors made strong proposals and were invited to participate in a benchmark competition. Vendors were scrutinized in areas such as support and product direction. One surprise was that the System/36 not only scored well in product direction but also won the benchmark with the best price/performance. "It wasn't just a matter of saying this box is good for what we are doing. We had to look at where each company was going — and things such as whether we could get software," Klinger says.

By the end of 1984, Ryder had chosen its hardware and formed a team to examine user requirements for software. "We spent almost all of 1985 working with our field people, our business people," Klinger says. The company appointed a director of MIS field services, Al Benkert, to head the $29 million project, and system development began.

FOR RYDER, the strengths of the System/36 include the integration of data base structures in the processor and the ability of non-MIS personnel to run the system.

"We're now in the final throes of coding. We expect to complete that in May, which will take us through component system testing, although not integration testing. Then we have to go about putting it all together and making it work here at headquarters before we put it into a district as a pilot test," Klinger reports. The pilot site is likely to be Miami because of its proximity to the 320 MIS personnel at headquarters.

System development is being handled by Ryder personnel as well as contractors from three consulting firms: PDA, Inc. in Overland Park, Kan.; Centurion Systems, Inc. in Stone Mountain, Ga.; and Auxton Computer Enterprises in Maitland, Fla.

While most System/36 projects are based on RPG II, Ryder's systems are written primarily in Cobol. Ryder had Cobol programmers on staff and found Cobol performance was comparable with RPG.

For Ryder, the strengths of the System/36 include the integration of data base structures in the processor and the ability of non-MIS personnel to run the system. The System/36's drawbacks, according to Klinger, include deficiencies in backup abilities, which he expects to improve before the rollout.

While IBM's marketing efforts have emphasized the System/36 as an office automation system — and the product's critics do question its ability to handle tasks such as heavy word processing loads — Ryder's office needs in the districts are secondary to more traditional DP requirements. "We might hang a few PCs of the System/36s for word processing, but even then, most of the word processing would be done on the PCs," Klinger says. In addition, the System/36 is not seen as a means to off-load tasks from the mainframes. Ryder's strategy is to keep corporate-level applications, such as major planning and modeling jobs, nationwide dispatch, financial management and personnel records, on the mainframes.

At the district level, the System/36s will handle daily administration, maintenance records, sales support, limited personnel records and the truck rental process. The mainframe-to-mini communications will come into play in uploading information such as employee time records and financial data, or downloading software and moving data among districts. A truck leased in one district might be repaired in another. Relevant records will be sent from the System/36 in the district providing the service through the mainframe to the original district.

The System/36 will also be used in some areas to support Ryder's first rental-counter automation, handling reservations and rentals on-line.

"The systems won't just change the way things are done. They will provide opportunities. What we are providing is a capability, but what we have to be careful of is not trying to force it on people all at once," Klinger says, noting that projects such as the rental-counter automation will be phased in.

Benkert notes that one of the challenges for developers has been keeping consistency in how the various applications, designed by different developers, appear to the end users. "To the end user, the system has to look like a single entity, and to do that, we have to keep the communication lines open between the different personnel," Benkert says.

Hypers

CONTINUED FROM PAGE 57

could prove still more successful. As any conference's organizers would hope, attendees shared ideas during sessions and over coffee. Some extremely bright users also could be heard having intelligent conversations with equally intelligent systems designers at vendor exhibits.

But it was comical to watch when those users would be cornered by the marketing people stalking the show floor. The marketers — perfectly dressed, smiles pasted to their faces — would stretch out their tentacles and grab innocent victims.

They would wave glossy product brochures and spout the same type of drivel that they dumped on MIS managers at past National Computer Conferences and on personal computer dealers at past Comdex shows.

Step right up, folks . . .

That spiel typically started with a question about whether the victim had heard about the vendor's new product and followed with a rehearsed, five-minute lecture on how supercomputing is the wave of the future. It should be recognized that some marketing people know their products and do a good job. But the ones under discussion here are those who probably were selling ocean-view house lots in Nebraska two years ago.

Many of those supercomputer users have spent their lives in university and government research centers and haven't been exposed to such tactics. But it is a sure thing that few needed to be sold on the concept of supercomputing. In some cases, they were the ones who had developed the theories on which the vendor's products or competing products are based.

The marketer was wasting time trying to dazzle those attendees with buzzwords and techno-speak.

So, the typical conversation ended with the bored user asking just one technical question about system architecture or about a modeling application. The question would leave the marketing type stammering and stuttering in an attempt to find a memorized answer or, preferably, another victim. The user was then free to look for someone in the vendor booth who knew what he was talking about.

It is unlikely that there has been another computer show at which the hucksters have been so out of place and so often put in their place. It was refreshing to see and offers hope that it can happen again at future conferences — supercomputer or otherwise.

Connolly is *Computerworld*'s senior editor, systems & peripherals.

Do-it-yourself lab testing

BY JAMES CONNOLLY
CW STAFF

Usability laboratories have been utilized by computer makers for several years, but it is still uncommon for user companies to run their own video camera-equipped test labs.

Ryder Truck Rental, Inc., now in the midst of its biggest MIS project, is using such a lab to test equipment and applications being developed for an IBM System/36-based district-automation project. The lab is now a permanent fixture at corporate headquarters.

MIS and human resources officials recently completed their first tests of the facility. About 15 members of the team watched on closed-circuit television as workers in another room tested keyboards customized by three vendors.

Cameras simultaneously focused on employee faces and hands, while microphones picked up comments about the keyboards. The feedback helps project managers know, for example, whether function keys are in the right locations or whether commonly used keys require unnecessary hand strain.

Future sessions will explore whether non-MIS employees easily understand various applications. "We are not going to be able to do every application, but there are some things we will want to get user feedback on," says Dennis M. Klinger, vice-president for MIS at Ryder. He says the observers include people who log employee mistakes, facial expressions and comments as they work with an application or piece of hardware.

Ryder's plans include relocating cameras from floor-standing tripods to less-intrusive wall mounts and redesigning the lab as an office.

The usability lab is only one way Ryder is keeping users involved in the System/36 project. System developers have gone repeatedly to branch locations for input on user requirements. In addition, Ryder transferred non-MIS users from districts into headquarters. Those users provide day-to-day input as applications are developed.

Apollo hits

FROM PAGE 57

in the range of all contemporary graphics engines, but it's laid in Apollo's Domain environment, which I think is superior to everybody else's environment," Heim adds, comparing the Apollo products to Mountain View, Calif.-based Silicon Graphics, Inc. and Hewlett-Packard Co.

"Getting graphics performance in the Apollo architecture is what sets it apart from everybody else," he observes.

Meanwhile, beta-test user Bob Laurila, a TRW computer-aided engineering specialist, says the Apollo DN590 is comparable to HP's workstation.

HP model 'a hair faster'

"In general, the Apollo is better. The operating environment provides faster disk-access. If you're starting from scratch on a model and pull it off a disk, the Apollo will beat HP on the same model. But if you're talking pure graphics, I'd say the HP is just a hair faster, but not all that noticeably," Laurila says.

The DN590 Turbo is Apollo's first entry in the high-end, 3-D graphics arena and offers a standard 24-bit plane for accessing 16.7 million colors simultaneously.

Silicon Graphics' Iris 4D/60 workstation offers users an 8-bit plane standard for 256 displayable colors, with a $4,000 red-blue-green color option for the remaining 16 bits, says Deepak Natarajan, Silicon Graphics' Iris 4D/60 product manager.

However, Natarajan notes that the Iris machine is available with standard 16-bit planes, eight for color, four for overlay and underlay functions and four to recognize bit planes.

"Compared to the DN590, we can do something they cannot do: multimode graphics," Natarajan says. "We can display multibuffered and single-buffered modes of operation simultaneously, in up to 16 separate windows. And we support this in hardware."

Although the DN590 Turbo supports a drawing speed of 150,000 vectors/sec., compared to the Iris 4D/60's 140,000 vectors/sec., both workstations support up to 5,000 polygons/sec., according to vendor specifications.

"The extra 10,000 transformations per second are probably not visible to the user. It's like running very fast to the store and having to wait in line later. It doesn't make any difference," Natarajan says.

Apollo, HP and Silicon Graphics support a Z-buffer in hardware that enables users to solve hidden surface removal and see the front as opposed to both the front and back of a 3-D object.

HP's 350RSX workstation and Apollo's DN590 offer a 16-bit Z-buffer as opposed to Silicon Graphics' 24-bit Z-buffer, Natarajan says.

Apollo is aggressively pursuing the high-end 3-D market and has spent more than $10 million since 1986 in high-end graphics research, says Roland D. Pampel, the vendor's senior vice-president of technology and marketing.

The company plans to increase its graphics research and development staff from about 90 to 120 people in the next few months, Pampel says.

Penetrating 3-D market

Other vendors such as Natick, Mass.-based Prime Computer, Inc. are entering the high-end 3-D graphics market. Prime is reselling the Iris 4D/60 under its own label.

Apollo claims a price advantage over the other vendors. The DN590 Turbo starts at $57,900. The HP workstation is priced at $70,900, while the Silicon Graphics and Prime workstations cost $94,900.

An Apollo 3-D solids modeling system with a DN590 with 8M bytes of memory, 24-bit planes, a 16-bit Z-buffer, an FPX floating-point accelerator, a 3-D graphics accelerator and 190M bytes of storage costs $69,900.

Apollo also improved throughput and lowered the prices of its DN570 and DN580 workstations.

The DN580 Turbo starts at $49,900, and the DN570 Turbo starts at $39,900.

The vendor also introduced DSP500 network servers with file-server and compute-server capabilities.

Siemens boosts printers' IBM links

BY JAMES CONNOLLY
CW STAFF

ANAHEIM, Calif. — Siemens Information Systems, Inc. has moved to improve the IBM compatibility of its mainframe-class laser printers with the announcement of two models incorporating all-points addressability (APA) and advanced-function printing (AFP) providing greater support for functions such as electronics forms and graphics printing.

The announcement of the 2200 Model 3 and 2300 Model 3 comes two years after Siemens introduced "AFP-like but not AFP-compatible" versions of the 2200 and 2300, according to Michael G. Kurz, director of marketing for Siemens' Peripheral Systems Division, the U.S. computer products arm of West Germany-based Siemens AG.

IBM compatibility

The printers were designed to be compatible with IBM 3800 printers and to be used with IBM mainframes and compatibles. The AFP software, which runs on a mainframe, provides the architecture to support features such as APA and graphics printing. APA, which is driven by a controller in the Model 3 printers, supports placement of a dot anywhere on a page for support of sophisticated graphics without the restrictions of line-oriented laser printers.

The Model 3 versions also support up to 5M bytes of printer memory, Siemens said. Kurz said that Siemens' advantages over IBM include the use of cold fusing technology in the 2200s for faster start-ups and printing on special materials.

He said Siemens also offers perf-to-perf printing, which permits printing of large graphics such as computer-aided designs across multiple sheets of perforated paper.

The 2200 prints 103 page/min. and competes with the IBM 3800 Model 6, Siemens said. The 2300 reportedly prints 206 page/min. and competes with the IBM 3800 Model 3. They are based on technology introduced by Siemens in 1976.

Kurz said the Model 2 versions remain available, and upgrade kits are available to Siemens' installed base at a cost of $40,000 for the 2300 and $30,000 for the 2200. He said the 2200 Model 3 costs $189,000 and will be available during the third quarter. The 2300 Model 3 costs $283,000 and should be available during the fourth quarter.

Siemens also announced three options for its 2200 and 2300 printers. The Printer Online Paper Processing system reportedly allows operator-free printing of fanfold or cut-sheet paper for several hours. A typical paper handling system costs $95,000.

Siemens said it now supports magnetic-ink character-recognition printing on continuous forms through a new toner formulation, which costs $25 for a 2.2-lb bottle.

Siemens' Forms Generation System is a host-based application that allows generation of electronic forms without the need for a dedicated workstation. It runs under IBM MVS and DOS/VSE and costs $5,675.

NEW PRODUCTS

Processors

Force Computers, Inc. has introduced the **RR-3 RAM/ROM** board, which is said to provide main-bus access to up to 16M bytes of memory for VMEbus-based 32-bit systems.

The RR-3 is said to accommodate static random-access memory (RAM) as well as erasable programmable read-only memory (EPROM) and E²PROM. Features include battery backup for CMOS memory chips. Memory space is partitioned into two banks in order to permit use of two different memory types.

The RR-3 is priced at $41,070.

Force Computers, 727 University Ave., Los Gatos, Calif. 95030.

Star Technologies, Inc. has announced **ST-VAXBI-I**, a 10M-byte interface said to link Star array processors to the Digital Equipment Corp. VAXBI.

The ST-VAXBI-I is said to provide an interface to any VAXBI-based VAX host operating under VAX/VMS. It includes two boards, a 50-ft connecting I/O cable and application-support software.

The ST-VAXBI-I supports burst-transfer rates of 10M byte/sec. on a dedicated VAXBI and up to 5M byte/sec. on a shared VAXBI. Multiple-array processors may be attached to one VAX system, or multiple VAXs may share one array processor.

The interface costs $15,000 including driver and $5,000 when purchased with an array processor.

Star Technologies, 515 Shaw Road, Sterling, Va. 22170.

Triconex Corp. has announced the **621 interface module** said to allow users to combine the company's Tricon fault-tolerant controllers with Honeywell, Inc. IPC 621 I/O systems.

The interface consists of two single-board modules and the company's Model 4400 Interface Module and Field Termination Module. Each board occupies a single module slot in the Tricon controller. The 621 interface provides one parallel channel, supporting up to 13 daisy-chained Honeywell I/O racks over a total bus length of 100 ft, and two serial asynchronous interface channels that can each support up to five Honeywell I/O racks over a total bus length of 4,000 ft.

The 621 interface module is priced at $4,000.

Triconex, 16800 Aston St., Irvine, Calif. 92714.

An emulator for the Motorola, Inc. 68HC11 microcomputer, the **HP 64265A**, is now available as a subsystem for the HP 64000 and HP 64000-UX development systems from **Hewlett-Packard Co.**

Model 64265A is a nonintrusive emulator said to run at MC68HC11 operating speeds to 2 MHz. It provides an execution environment for testing and modifying hardware and software during product development.

Features include 64K bytes of emulation memory, emulation memory mapped in 16-byte blocks, simulated programming of electrically erasable read-only memory, six hardware breakpoints and symbolic addressing of all operations.

The HP 64265A emulation subsystem is priced at $13,400.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Plessey Microsystems has announced the **PME 2SB**, a dual-ported dynamic random-access memory board designed for high-density storage for VMEbus systems.

The PME 2SB is said to feature a block-transfer mode allowing transfer of paged data between the VMEbus and VME Subsystem Bus. It comes as a 1M-, 2M-, 4M- or 8M-byte board and includes data read-ahead on block transfers and pipelined address and data cycles.

An 8M-byte PME 2SB is priced at $3,990.

Plessey Microsystems, One Blue Hill Plaza, Pearl River, N.Y. 10965.

Graphics systems

Data Translation, Inc. has introduced the **DT1451** high-resolution frame grabber.

The single-board frame grabber, designed for Sun Microsystems, Inc. Sun-3 workstations, is said to include a built-in Arithmetic Logic Unit for executing math and logic operations on single or multiple 512- by 512- by 8-bit images in real time. The DT1451 is said to be capable of digitizing and displaying images in real time.

Processing functions include adding images together, subtracting images from each other, averaging images to reduce signal noise and multiplying or dividing images by a constant.

The DT1451 is priced at $2,995.

Data Translation, 100 Locke Drive, Marlboro, Mass. 01752.

Data storage

EMC Corp. has announced the **VS-IDC**, an intelligent disk controller for Wang Laboratories, Inc. VS 85, 90 and 100 computers.

The VS-IDC is equipped with a Motorola, Inc. 68000 series microprocessor and supports up to four drives. It has 64K bytes of first-in first-out memory, so the system bus can interface with Winchester

disk drives. The controller supports 288M-, 314M- and 620M-byte Winchester drives and a 76M-byte removable cartridge.

The VS-IDC comes with a power-on, activity and fault lights for monitoring board status and usage levels.

The VS-IDC is priced at $9,500.

EMC, 171 South St., Hopkinton, Mass. 01748.

Control Data Corp. has announced the **FSD III**, a 9-in. fixed-storage drive.

The FSD III is said to be capable of transferring more than one million bytes of sustained data without moving the head positioner. It offers 1.03G bytes of unformatted storage capacity and features data transfer rates of 2.4M byte/sec. Data is recorded on seven disk platters with 26 heads at densities of 1,283 tracks per in. and approximately 20.25K bits per in. Average seek time is said to be 14 msec.

The FSD II is priced from $6,990.

CDC, Box D, 8100 34th Ave. S., Minneapolis, Minn. 55440.

Hitachi America, Ltd. has introduced its **CDR-1503S** compact disk/ read-only memory drive package.

The package is said to feature two audio channels that allow integration of voice, music and data. It offers audio and data storage, daisy chain connection of up to four drives and 8-bit bus IBM Personal Computer interface or small computer systems interface facilities. Average access time is said to be 0.4 seconds.

The CDR-1503S is priced at $884.

Hitachi America, 950 Elm Ave., San Bruno, Calif. 94066.

Terminals

I-O Corp. has enhanced its **I-O 1181** IBM System/34-, 36- and 38-compatible video display terminal.

Enhancements include a choice of a white CRT screen, a 122-key keyboard said to be interchangeable with the 83-key keyboard, tilt and swivel radius increased to 325 degrees and an optional 5219 word processing printer port. The printer port is said to support Hewlett-Packard Co.'s Laserjet Printers.

I-O Corp.'s *I-O 1181 VDT.*

The basic screen-dump version of the terminal costs $1,070. With the 5219 word processing printer port, the terminal costs $1,995.

I-O, 2256 S. 3600 West, Salt Lake City, Utah 84119.

Printers/Plotters

Integrated Marketing Corp. has introduced the **Auto-T Switch**, a peripheral-sharing product.

The Auto-T Switch is said to be capable of connecting up to six computers to one serial or parallel printer or plotter. It automatically scans input lines and forwards data from the first computer in the queue to the printer or plotter, maintaining the connection until the operation is concluded.

The Auto-T Switch is available in various configurations of a combination of serial or parallel inputs and outputs.

Prices for the Auto-T Switch range from $149 to $249.

Integrated Marketing, Suite H, 1031 E. Duane Ave., Sunnyvale, Calif. 94086.

Interface Systems, Inc. has announced an enhanced version of its **ISI 424** desktop dot matrix printer designed for use with IBM System/34, 36 and 38 minicomputers.

The enhanced desktop printer is said to allow users to print on-demand barcode output using Code 39 and Interleaved 2 of 5.

The ISI 424 is said to be a plug-compatible replacement for the IBM 5256 and 4214-2.

It prints at 200 char./sec. in draft mode and 50 char./sec. in near-letter-quality mode.

According to the vendor, ISI 424 users are able to print solid-formed characters up to seven times larger than standard output.

The ISI 424 costs $2,950.

Interface Systems, 5855 Interface Drive, Ann Arbor, Mich. 48103.

Power supplies

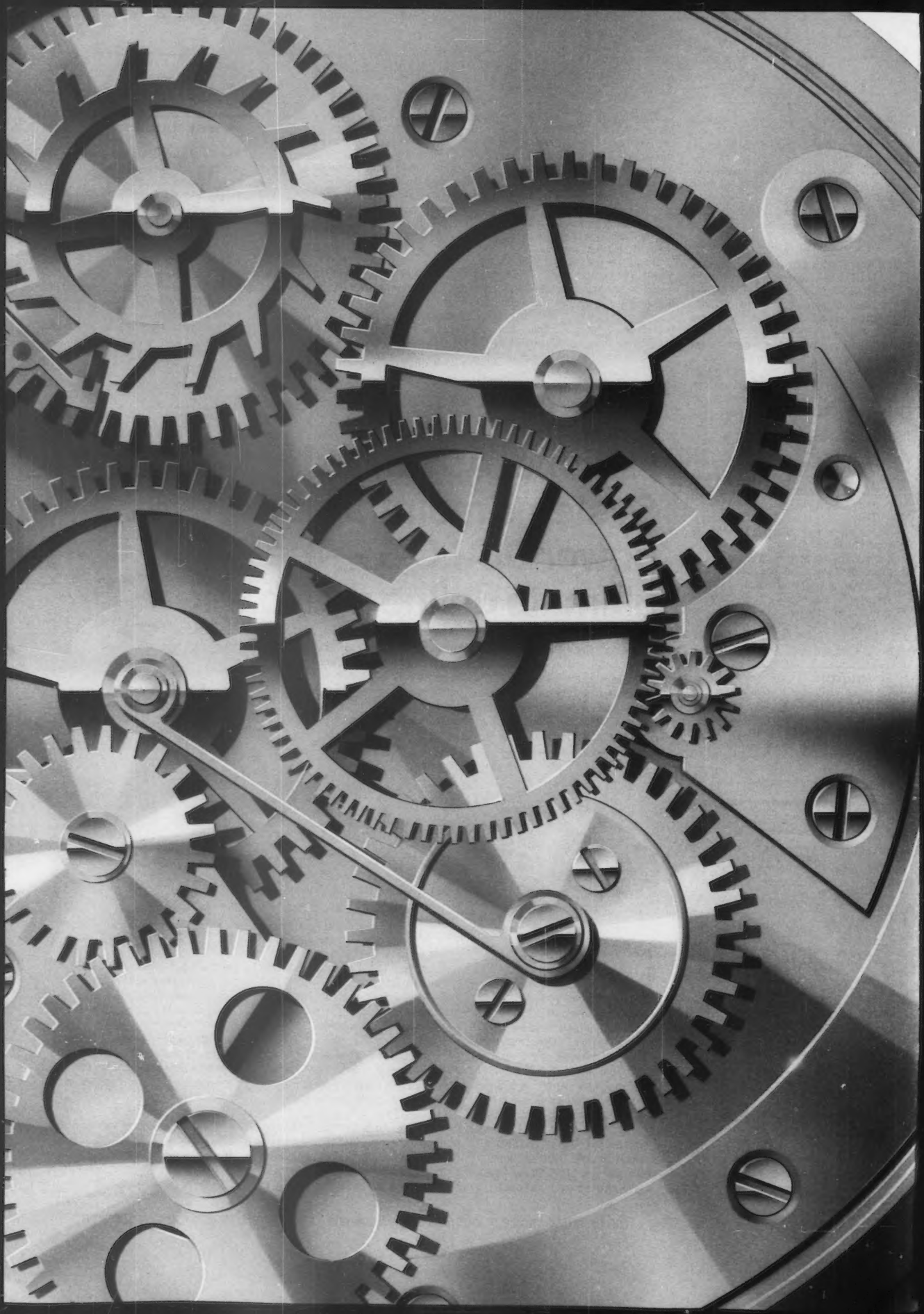
A series of **surge-suppression devices** has been introduced by **Sola**, a unit of General Signal Corp..

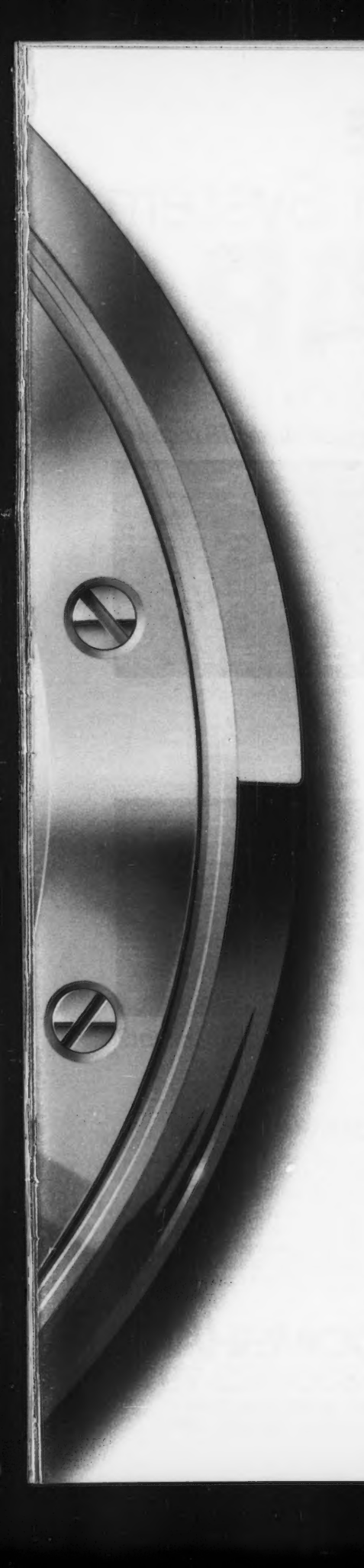
The seven-model series includes a power-control center model, plug-strip models with six outlets and duplex plug-in models with two outlets.

All models are said to offer a maximum transient current rated at 6,500 amps. Peak wattage capabilities are said to be 2.5 million for normal mode and 170,000 for common mode. All models come with a mode-indicator lamp.

Prices range from $69.50 to $179.50.

Sola, 1717 Busse Road, Elk Grove Village, Ill. 60007.





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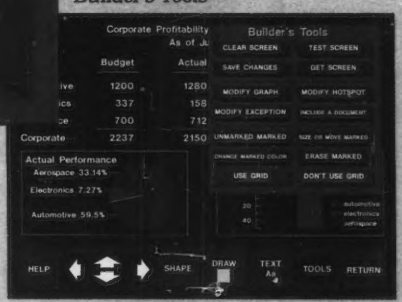

How does EIS integrate diverse information sources?

How easy is EIS to implement?

Dates and Locations

Atlanta, GA	May 19	New Orleans, LA	June 17
Austin, TX	June 10	New York, NY	June 2
Birmingham, AL	May 21	Orlando, FL	June 4
Boston, MA	May 27	Parsippany, NJ	May 27
Charlotte, NC	June 9	Philadelphia, PA	June 2
Chicago, IL	May 21	Phoenix, AZ	June 23
Chicago, IL	June 23	Pittsburgh, PA	June 18
Cleveland, OH	June 16	Research Triangle Park, NC	June 10
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End-user computing: Investing for high returns

Lessons learned by progressive organizations can keep a grand concept from running amuck

BY J. DANIEL COUGER

End-user computing has, potentially, the greatest impact of any development in the computer field. Some aspects of its growth, such as personal computing, are exponential and could easily continue that pattern through 1990. However, its cost is far greater than anticipated — much more than it should be. Worse yet, the obvious benefits realized in the past three years are threatened because of below-the-surface problems expanding and boiling like a volcano near eruption.

To identify the cause of these problems, 17 companies were selected for study. All had long-term computing experience and were representative of major U.S. industry categories. Eleven experienced significant problems in implementing end-user computing. Seven were overspending by a factor no less than three and as much as 10. The situation may be even worse in four other companies because they had not prepared budgets for end-user computing.

On the other hand, six firms were realizing a return on investment on the order of 2-to-1 to 6-to-1. They were realizing benefits of the magnitude of millions of dollars annually.

In the 11 problematic firms, there was a proliferation of micros and micro software, which were installed by inexperienced people — the users. The principal problem was lack of adequate planning for end-user computing. Had the firms standardized on micro hardware and software, training could have been more consistent, the learning curve simplified and downtime reduced.

However, the highest cost factor of all could not be easily ascertained. Without standardization, the concealed costs of errors resulting from the proliferation of hardware and software may exceed a company's measured excess cost.

The problems of end-user computing are not insurmountable, as shown by six of the survey companies. Analysis of their successful approaches to implementing end-user computing reveals a generic approach that will enable other organizations to leapfrog one of the three stages of end-user computing growth, which consist of interactive terminal access, information centers and end-user computing. The result is improvement in both efficiency and effectiveness.

WARREN GEBERT

Pattern for success

According to a 1983 report by Framingham, Mass.-based International Data Corp., 1.85 million personal computers were shipped in 1983. By year-end 1987, the total base of installed PCs will exceed 20 million. If the pattern of the 11 less successful companies in the survey is prevalent throughout the U.S., the result of installing 20 million micros could be chaotic.

However, the risks can be greatly lowered by following the guidelines of the six successful firms, and most companies can then expect to realize the potential of end-user computing. Those guidelines are as follows:

- Adopt a proactive rather than

This article will appear in the "Proceedings of the 1987 National Computer Conference" (Vol 56.) © 1987 AFIPS.
Couger, a professor of computer and management science at the University of Colorado in Colorado Springs, will present a session, "Have You Discovered the Markets for Your Information Services?", at the 1987 National Computer Conference in June.

- **Soft controls promote individual creativity**
- **Technicians see support as hand-holding**
- **Adopt a proactive approach**

reactive approach to implementing end-user computing.

- Conduct cost/benefit analyses for each potential computer application.
- Provide soft rather than hard controls for acquisition and use of PCs and related software.

The study began with a review of five previous surveys on the various aspects of end-user computing. Next, the 17 U.S. firms were selected for in-depth analysis. The net annual income of each corporation ranged from $100 million to $500 million. The total number of employees ranged from 3,000 to 45,000. All of the companies had experience with mainframe computers for 15 or more years. Success in end-user computing had no correlation to the size of any of the companies. The geographic distribution of the firms was fairly even.

The trend toward end-user computing has evolved from three distinct and parallel paths. All three paths provided end-user computing but to a limited degree. Only with the convergence of the three paths is the potential of end-user computing — that is, integrated end-user computing — realized.

Interactive terminal access. The earliest path, interactive terminal access, primarily provided users with information retrieval capability. Users could directly interact with a computer but only in a very limited way. Only the forerunners to user-oriented languages were available, and they were not widely used. Technical support came from the MIS personnel assigned to develop the users' transaction processing systems (for example, order processing or inventory control) rather than from a special cadre of personnel assigned exclusively to deal with users' personal computing needs.

Information centers. The second path, information centers, was the first attempt to pull together the services needed for an individual to operate with relative independence. The early information centers were physical locations to which users could go for training, technical assistance, retrieval-only access to live data bases, such as the firm's customer data base, and manipulative access (the ability to change contents) to copies of data bases.

Today, the information center is not confined to one physical location but is an MIS organization entity to provide these services to users wherever they reside. Although this is a significant improvement from the previous delivery system, information centers do not provide many of the user-friendly benefits of personal computing.

Micro computing. The third path, micro computing, is the only one of the three that emerged primarily outside of the direction of the MIS organization. The low cost of both PCs and PC software enabled user organizations to acquire these systems outside the purchase controls of MIS. The user-friendliness of these systems enabled users to operate relatively independently of MIS technical assistance. But independence was also a disadvantage. PC users rarely had access to MIS data bases. Also, most PCs were acquired without communications capability.

Integrated end-user computing. The convergent path, integrated end-user computing, not only provides the best of each of these earlier delivery services but also enhances all three. PCs that are compatible with mainframe computers can access data bases and utilize sophisticated mainframe tools as well as operate in stand-alone mode to avail themselves of the rich variety of PC software. This stage of the end-user computing evolution also includes delivery of electronic mail capability using the same PC. With this concept, office and computing activities become fully integrated. Also included in this stage of evolution is access to external as well as internal data bases.

End-user computing advantages

The rapid growth of end-user computing is itself the best indicator of its benefits. It is obviously meeting the needs of a large body of managers and staff. Other advantages of end-user computing include the following:

- It offers simplified tools for individuals to build their own applications and models.
- It offers improved access to data bases for information retrieval and for data as input to models.
- It increases user productivity. Users are able to eliminate the time required to translate their requirements to MIS professionals for development of systems by the MIS department. They are also able to reduce implementation time by prototyping their own systems, and they can build applications tailored to their individual needs.

The principal advantage needs to be viewed from the macro perspective of the effect on management in general rather than the micro perspective of individual users. The end-user computing approach has brought a result long awaited by the computer industry — computer literacy. We are on the threshold of widespread use of the computer throughout the company.

The number of individuals directly using computers has more than doubled in the past three years in those organizations that have implemented end-user computing. On the other hand, the hoped-for level of managerial use has not been completely realized. The large user group is the professional, nonmanagerial staff. Managers are delegating the tasks of developing models to their staff and are using the systems primarily for information retrieval. To change this pattern, more

functions need to be provided in an integrated manner with more user-friendly access.

According to the surveys, few companies have formally analyzed the cost-effectiveness of end-user computing. Where the justification process for traditional MIS applications is formalized, the one for end-user computing rarely is. While each of the surveys cited benefits, few had been quantified. Why?

Surprisingly enough, the approach to end-user computing has followed the pattern of initiating computing in industry 25 years ago. In many companies, end-user computing began with a missionary thrust. The prevalent view was that converts could not be gained without providing the service to users free of charge, that is, without chargeback to their departmental budgets. Several organizations that have had end-user computing in some form for more than 20 years have not emerged from the missionary stage.

Because of the burgeoning costs of end-user computing, companies are being forced to change the "free-goods" policy and to move into Stage 2 of the traditional MIS development pattern in which chargeback occurs. In companies with a chargeback policy, the costs of computing are distributed to users according to the amount of services used.

Stage 3, where cost/effectiveness analysis occurs, will be realized when companies move to integrated end-user computing. Because of access to all computing facilities, data bases and software, a higher level of benefits and quantification is facilitated. Users can more easily assess the total effect on their jobs.

Problems on the rise

Problems are not diminishing with the widespread growth of end-user computing. On the contrary, they are expanding.

Surface issues include excessive equipment cost, inefficient users, inefficient applications and friction between the end-user computing technical staff and the rest of the MIS department. Below-surface issues include the proliferation of data bases, software products and PC machine types and the problem of interfaces between tools and developing systems that are difficult to maintain.

With inexperienced users, computing costs soar. Much of the learning is trial and error. Even with computer experience, personnel without the training of an MIS professional will be relatively inefficient system developers. In addition, the fourth-generation languages are tremendous resource-burners. That is, associated computer costs are often higher than running applications developed with procedural languages.

Computer costs to support end-user computing have grossly exceeded projections. For example, in four of the six progressive organizations in which the in-depth analysis occurred, the three-year plan called for end-user computing usage to approximate an extra shift of mainframe time; instead, an entire mainframe computer was required.

Still in the missionary stage, many companies have yet to install a chargeback system. Without a chargeback system, users have less incentive to be efficient.

Although the typical end-user computing support group reports to the MIS organization, some disruptive results have occurred. System personnel responsible for the large transaction-processing applications have complained that their user contact has been diminished by the technical personnel assigned to end-user computing. It appears that the change is not caused by the end-user computing personnel's overtly usurping that privilege but rather by the fact that users developing their own systems via end-user computing naturally spend more time with the person most familiar with end-user computing facilities.

> THE ESSENCE of end-user computing is service. Although I know of only one company that explicitly uses the slogan, "The customer is always right," that approach is the implicit objective of many end-user computing facilities.

The data proliferation problem is perhaps the most insidious and costly. Data base security procedures prevent user access to on-line data bases, except in retrieval-only mode, so they cannot alter the data. Users who want to manipulate data to perform analyses must be provided with copies of a data base. The resultant problem is inconsistency of reports when users are using data bases that are not as up-to-date as the reports produced by the transaction-processing applications.

The solution that has been used is to give everyone current data. In this mode, a "shadow" data base copy is provided daily from the corporate mainframe. While the currency problem is resolved, a significant increase in data base cost occurs.

With PCs from a diversity of vendors using different versions of software, the cost to maintain software and hardware is higher than necessary. However, at present, no single vendor meets all the needs of a customer. Different systems also complicate communication between PCs and with mainframes. In addition, some companies make available to users several fourth-generation languages, thereby causing interface problems. To interface, users must learn several sets of commands.

Some users continue to expand their application until it becomes so large and complicated that they want to transfer its maintenance to the MIS department. Because it was not developed with MIS department standards, it is difficult to maintain.

The customer is always right

It is not surprising that the variety of approaches to implementing end-user computing has resulted in a hodgepodge of hardware and software. The essence of end-user computing is service. Although I know of only one company that explicitly uses the slogan, "The customer is always right," that approach is the implicit objective of many end-user computing facilities. The goal is to undergird improvement in user effectiveness.

The emphasis on effectiveness of computer use rather than efficiency can hardly be faulted. However, it is not necessary to sacrifice one to attain the other. Satisfactory results are possible. Examples in the PC area are as follows: limiting selection to compatible PCs; standardization on an operating system (for example, a multiuser system with communications capability between PCs and to the mainframe); standardizing on application packages (for instance, a single integrated spreadsheet package and a single word processing package).

Examples of standardizing on fourth-generation tools include one language with comprehensive information retrieval capability and one language with strong modeling capabilities.

Although the move to cost/effectiveness analysis should occur as soon as possible, a chargeback system is a satisfactory interim policy. Users who must pay for their use will prize efficiency as well as effectiveness.

Improved user training programs will produce higher levels of efficiency in computer use. For example, there are many tricks and shortcuts in spreadsheet development that can be conveyed in formal training sessions. The same is true for use of fourth-generation languages.

Through improved attention to planning, the potential benefits of end-user computing are substantial.

Soft controls

Progressive MIS organizations have found that formal planning can be introduced to achieve integrated end-user computing without resorting to increased control measures. Many of the benefits of end-user computing have been the result of giving the end user the freedom to experiment with other than traditional ways to develop systems.

Prototyping is an example. It has worked so well in end-user computing that the MIS function is adopting it for developing certain types of transaction processing systems. In prototyping, a simple model is computerized and tested. Despite its simplicity, the model produces useful results. It is then enhanced and retested. Each cycle of refinement produces improved results.

Tight or "hard" controls may stifle user creativity. A better approach is "soft" controls. Examples of soft controls being adopted by progressive MIS organizations include the following:

- Providing PC maintenance for a select set of PCs, encouraging users to acquire only those PC types.
- Providing centralized purchasing to attain quantity discounts for both PCs and software while also limiting the number of PC types and ensuring compatibility.
- Providing training only on a select set of software and fourth-generation tools, motivating users to confine their activities to that set alone.
- Providing file-sharing software so that a data set developed or acquired by one user is also available to others.
- Serving as the central agency for obtaining new releases of software, then implementing them for all interested users, which will thereby reduce the possibility of incompatibility and inconsistency from multiple releases existing throughout

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the organizations.

- Providing training in application development methodology to help users better manage their development projects and adhere to corporate standards of development to facilitate the maintenance of applications.
- Organizing an electronic mail system and implementing it for anyone with communications-compatible PCs as opposed to providing electronic mail only to persons with computer terminals.

Lack of a hard controls approach will not prevent companies from moving to integrated end-user computing. On the contrary, soft controls are a more practical approach because they permit individual creativity within an environment of cooperative, mutual objectives.

A MAJOR barrier is the attitude most technical personnel have toward spending a major portion of their working hours assisting users. Their terms for this activity are frequently derisive, such as "hand-holding" and "nursemaiding."

Another factor the progressive firms have in common is effective technical support. However, the key ingredient is not the availability of technical know-how; it is motivating those individuals to help end users. Some corporations with adequate technical expertise are not meeting their objectives in integrated end-user computing because of their approach to using that expertise.

A major barrier is the attitude most technical personnel have toward spending a major portion of their working hours assisting users. Their terms for this activity are frequently derisive, such as "hand-holding" and "nursemaiding."

It is not easy to find technical personnel who find such work challenging. They would rather be back in the MIS department, solving complicated hardware/software issues.

These findings are not confined to the end-user study; they are also supported by research on the behavior of computer professionals. In my book with Robert Zawacki, *Motivating and Managing Computer Personnel* (John Wiley and Sons, 1980), a data base of more than 6,000 computer personnel reveals that most of these employees have a low need for social interaction and a high need for challenging work.

This situation need not be a deterrent. Only a small portion of the MIS department personnel is required to provide the technical support for end-user computing. Those few at the high end of the continuum of need for social interaction will not be turned off by the heavy interaction required to support end-user computing. The progressive firms in the study were successful in providing effective end-user technical support because they were able to select these few personnel out of the total MIS work force.

But the selection process alone was not sufficient to ensure success. The end-user support departments of the progressive firms shared one other characteristic. In each firm, the head of that support function was able to convince technical personnel who had a strong need for challenging work that end-user computing provided unique and substantive challenges. These managers emphasized two things. First, the work is state of the art in terms of technical advances. Second, the work's impact on the company is substantial because it is managerially oriented.

In short, these successful managers of end-user computing take great care in selecting employees with the characteristics appropriate for this activity and in identifying for these employees the importance and challenge of the work.

Natural progression

Integrated end-user computing is not a utopian concept. It is a natural progression from the convergence of the three prior paths of interactive terminal access, information centers and micro computing.

With integration, end users can utilize the computing power of mainframe computers in the company as well as those external to the company that use the same communications protocols. Access to internal and external data bases is also possible. Users can also communicate with other users for electronic mail, data and model sharing. They can also use personal computer software in stand-alone mode. With enhanced training and fourth-generation tools, they can construct their own tailor-made systems.

The imminent threat of high cost and inefficient resource use in end-user computing can be avoided through more precise planning for the move to integrated end-user computing. Effective and efficient use of computing resources is possible.

The planning process can be facilitated by analyzing the experience of progressive organizations and avoiding some of the inevitable mistakes that the front-runners incur by being innovators. Through this approach, it may be possible to leapfrog a part — or perhaps an entire stage — of the typical three-stage process of evolution of end-user computing, producing a personal workstation with a variety of capabilities. •

MIS struggles to hire wisely

Is four minutes really enough time to pass judgment on job candidates?

BY ROBERT ZAWACKI

In 1986, MIS departments in most U.S. firms spent more than 40% of their total first-quarter budgets on personnel salaries and benefits. Because of the tremendous cost associated with selecting and training MIS professionals, this key function is too important to be left to the personnel department. It must be controlled and driven by MIS managers with the support of personnel.

However, my research and the research of others indicates that MIS managers either leave this critical function to the personnel department or merely pay it lip service by going through the motions themselves; these managers' ability to pick "eagles" and eliminate losers is very poor.

Further, once MIS professionals are hired, those who are marginal performers are rarely, if ever, eliminated from the firm.

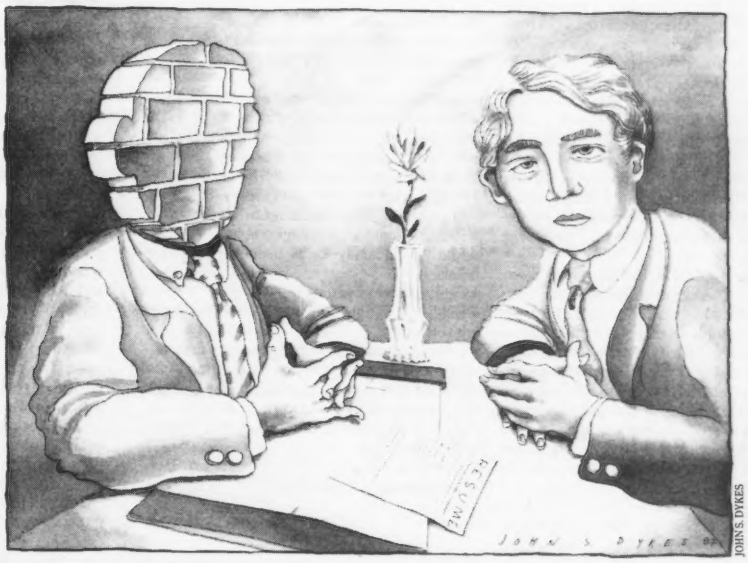
Literature, research and experience with numerous MIS organizations has uncovered a number of reasons for MIS's poor ability to select good candidates:

- Biases are established early in the interview.
- Interviewers tend to develop a stereotype of a good candidate and then match applicants with that stereotype.
- Interviewers benefit little from day-to-day interviewing.
- Because of the crisis-management, go-go environment within MIS, many MIS managers wing interviews rather than prepare and structure their questions.

Research has also shown that an interviewer's opinion of a candidate crystallizes within a mean interview time of four minutes. Often, interviewers unconsciously alter the outcome of an interview. They are influenced more by unfavorable than favorable information; rather than seek out the best candidate, they try to eliminate the worst. If the early impression is negative, then the interviewer speaks in a negative tone with the hope that the candidate self-selects out of the firm. If a candidate presents a favorable impression early on, the interviewer will be more talkative and speak in a more favorable tone.

In addition, seeing negative candidates before positive candidates will result in a greater number of acceptances than reversing this order. If interviewers keep seeing poorly qualified candidates, they lower their standards in order to make a decision quickly.

Given the pessimistic nature of the research findings, what can MIS do to choose eagles? It must consider a number of questions: What are the organization's objectives? What factors predict effective job performance? How can an MIS department structure an interview to increase its number of hits?



JOHN S. DYKES

How high can they fly?

Intuition suggests that MIS wants all the eagles it can recruit. However, eagles are achievers and require challenging, cutting-edge work or they become dissatisfied. As MIS departments change their concentration from development to maintenance, top management should consider a mix of people to match the jobs or attempt to enrich the jobs it offers if it is to hire a high percentage of eagles.

The Hartford Insurance Group is taking steps to improve the MIS interviewing process. Bob Mayne and Bob Drouin, directors of information management at The Hartford, along with Tom Streett and Dick Benashski, representing human resources, head a team of 14 maintenance managers who are looking at the hiring and management of maintenance programmers.

The Hartford is attempting to better match employees and jobs in the selection process. The team considers what maintenance managers want out of their work and shares ideas on what good managers are doing to motivate personnel. Through brainstorming sessions, the team developed a competency model of the behaviors of effective maintenance managers.

The company uses this model to select managers with appropriate skills; it also uses it as the basis for a training program for its maintenance managers. This type of creative group behavior is needed if MIS is to increase maintenance programmer motivation and productivity.

A programmer's job performance is influenced by three factors: ability, motivation and the challenge and visibility of the job (see chart page 74). The ability

Zawacki is a professor of management and organizational behavior at the University of Colorado in Colorado Springs. He will be presenting a session, "How to Pick Eagles: Interviewing for Success," at the 1987 National Computer Conference in June.

• Weakness lies in pinpointing motivation

• How many 'eagles' does an MIS group need?

• Preparing for a one-hour interview

Prepping the perfect interview

Effective interviewing requires active listening. The interview should not be an aimless discussion; rather, it should be a conversation with the purpose of exchanging knowledge to gain information. The following principles are offered as a brief guide for conducting an effective interview.

Plan for the interview. What do you want to find out about the candidate? Such items of concern might be the match between the candidate's growth-need strength and the job's motivating potential score, his qualifications, attitudes, personality, communication skills, availability or relocation problems.

Be prepared. What job do you have in mind for the candidate? If possible, review the candidate's resume or application before the interview.

Be interested. Give the impression that the applicant is the most important thing on your mind. Remember that the purpose of the interview is to match the candidate you choose with your organization.

Encourage applicants to talk about themselves. Find out about the candidate's interests, aspirations and ambitions. What were an applicant's reasons for selecting a particular course of study at college? What electives did the applicant choose and why? What did the applicant like most and least about previous jobs and why? What does the applicant think are his strong points? Weak points? Encourage applicants to talk freely about what they have accomplished and the way they worked out their achievements. Note how they describe themselves.

Accurately describe the opportunities in your firm and your activity. Be careful not to oversell, and avoid making any commitment about starting salary.

Send the applicant away with a positive feeling. Whether or not you would recommend employment, this is important to your corporation's image.

Remember to listen thoroughly and critically. Ask "why" and "how." Avoid asking questions that can be answered with a yes or no. Listen, don't talk, two-thirds of the time.

Dos and don'ts

Listed below are a few dos and don'ts to keep in mind during your interviewing.

Do:

- Evaluate the applicant as an individual.
- Eliminate any stereotyped ideas based on the applicant's race, color, religion, national origin, sex, age or handicap. For example: Don't assume that women have a much higher turnover rate than men — it is not statistically true.

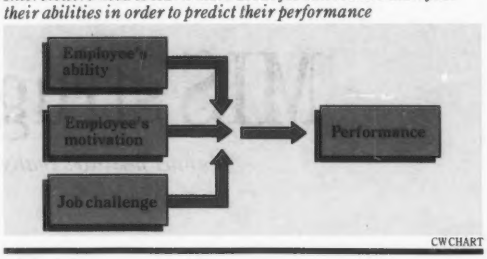
Don't ask a job applicant questions about:

- Race, national origin, religion or age.
- Marital and family status, including child-care needs.
- Plans to have children.
- Height or weight (unless this information is job-related).
- Friends or relatives working for your firm, unless you clarify the question by informing the applicant that company policy does not allow relatives of employees to work in the same cost center or in security, data processing, finance or personnel.
- Arrest records.
- The applicant's credit rating or other financial data.

ROBERT ZAWACKI

Performance factors

Interviewers need to learn more about job candidates than just their abilities in order to predict their performance



CW CHART

factor is determined by skill, education, aptitude and experience. In working with MIS organizations, I have found that managers are good at determining ability because they are aided by the candidate's resume. They can review the candidate's education and previous experience and make a sound prediction.

However, a programmer can possess all the ability in the world, but without motivation he will fail. Further, a programmer can be able and motivated; however, if the job does not challenge him or if the match between the person and the job is not a good one, that programmer will not produce to his ability.

The weakness of MIS managers in an interviewer's role lies in their inability to judge a candidate's motivation and the job's ability to challenge a candidate. Interviewers tend to focus on a candidate's ability because they are more comfortable in the technical areas — their own areas of expertise.

Predictive validity increases when the interviewer asks questions about the candidate's motivation. Good MIS professionals possess high growth-need strength (GNS), a measure of motivation and need for personal accomplishment. Prior to the interview, the interviewer should plan four or five questions that examine the candidate's need to be challenged, continue to grow, develop and move ahead. Also, the candidate's desire to continue his education is a good indicator of high GNS.

For MIS professionals, a job is challenging if it contains skill variety, task identity, task significance, autonomy and feedback. If a job is low or moderate in these five dimensions, the MIS department may decide to select a person with moderate GNS.

If MIS offers a job that is moderate in "motivating potential score" (MPS) — a measurement of a job's potential to motivate — and still decides to select an eagle, then the interviewer should represent job expectations for what they are. A company should promise only what the job can deliver. Employees with a high GNS working at a low or moderate MPS job will soon become bored and dissatisfied. These people need encouragement, joint goal-setting, career planning and increased managerial feedback; they also need more autonomy. Management can meet some of these high GNS needs by offering formal education.

The happy matchmaker

In determining a successful match between a potential job candidate and your organization, first determine how many eagles you want in your MIS department. Next, select a team of interviewers, including peers of the candidate. Line management must own and control the interview process, but a personnel specialist or psychologist can be available as support staff.

Providing training on good interviewing behavior is important. Managers should be trained to conduct an interview in a professional and timely manner. Robert Hall, senior vice-president with Prudential Asset Management Co., heads an MIS organization that matches professionals and jobs. Hall asked a committee of five MIS managers to define the abilities, skills, education and motivation they were looking for in new hires. After defining what their needs were, these managers designed interview questions to help MIS managers match people and jobs.

Each candidate should be provided one hour of interview time. Following the interviews, meet with the selection panel and pool the evaluation of all interviewers.

After determining who is the best match with the job, make a verbal offer to the candidate as soon as possible. Realize, also, that how you notify the unsuccessful candidates can effect goodwill — they may be a source of future talent. Remember, you may only hire one person, but many more may be talking about how your firm treated them.

Following the above guidelines can result in improved organizational effectiveness through a better match of your organization's needs and the ability and motivation of the employee you eventually hire. Choosing an eagle is not easy; it requires a commitment from MIS managers and peers. However, the results are well worth the effort. Either we do it right up front or we live with our mistakes. The choice is ours. •

MANAGEMENT

TAKING CHARGE

Jon Pearkins

CBT courses get useful

Formal training in technical subjects for data processing personnel is a necessity, and there are some exceptional new training tools available that maximize the return on time and money spent on this activity.

Let's look at the available alternatives:

Apprenticeship. Apprenticeship is one of the original methods, based on a mentor-student relationship. It has largely fallen by the wayside because of the expense arising from the length of time required for the student to become fully trained.

Classroom education. The downfall of apprenticeship has led to the rise of classroom education as the accepted method of formal training. In two days or a week of in-depth learning, the student gains a solid base of knowledge to begin productively using a new skill.

But classroom education has its drawbacks, too. The courses typically are expensive, and additional costs of travel, accommodations and lost work time can add up to two to three times the cost of the course itself.

There is in-house classroom education, but this is only practical for the largest organizations, and it is still difficult for them to find and fully use in-

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Report: Firms neglect security

BY DAVID A. LUDLUM
CW STAFF

Many companies are at risk from a lack of safeguards against computer abuse, which is generally not reported, causes major losses and may often go undetected, according to a report being prepared at the University of Minnesota.

Many computer users do not use safeguards that are built into their software and few use specialized security products, a working paper for the report states. Some managers believe security measures are ineffective, while others implement measures only after their systems are abused, the paper says.

However, data security administration is gradually being incorporated into American business and organizations, and security administrators generally are satisfied with the effectiveness of their efforts, the paper says.

The paper is the result of a study conducted by Detmar Straub, an assistant professor of MIS at the University of Minnesota, and Jeffrey Hoffer, a professor of MIS at Indiana University. Last year, under the auspices of the Data Processing Management Association, the two men conducted an anonymous survey of 5,489 managers on the deliberate, unauthorized misuse of information systems. The research was supported by Indiana University's Institute for Research on the Management of Information Systems and the Ball Corp. Foundation.

Along with examining security measures, the professors report on the frequency and types of computer abuse they found, the industries victimized and the occupations and motives of perpetrators, four out of five of whom were employees of the victimized organizations.

In responding to the survey, 211 organizations reported 259 incidents of abuse. The majority of the incidents were classified as "serious" or "extremely serious" for the cost or potential for damage; five cases reflected losses in excess of $100,000. The figures suggest about one-fifth of information systems organizations will experience computer abuse in a three-year period, the study states.

Of the abuses, 45% were detected through normal system controls, 32% by accident, 8% by computer security officers and 4.5% by auditors. The substantial portion detected by accident, along with other research, suggests that many incidents go undiscovered, the study says.

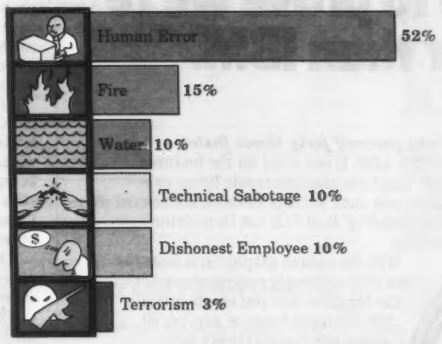
The study found 41% of the organizations had no ongoing security efforts. In some cases there were no security measures at all, not even passwords, a statistic the professors call alarmingly high. "No one is making any active attempt to prevent abuse," Straub says. "If they've got passwords, they're apparently being set up and no one is administering them. A good percentage have literally nothing."

Continued on page 82

Data View

Loss leaders

Common causes of corporate information damage



INFORMATION PROVIDED BY DATAPRO RESEARCH CORP.
CW CHART: SUSAN ALDAM

Users eye possibilities of DEC AI configurer

BY NINAMARY BUBA MAGINNIS
CW STAFF

Digital Equipment Corp. may soon let customers utilize its much-touted Xsel program, an expert system for configuring VAXs that is used by the vendor's sales force and is being test piloted by OEMs.

In addition to configuring VAX systems, Xsel provides preliminary computer room floor plans and generates output that can be fed into DEC's automated quote system — capabilities that have spurred interest among OEMs and large DEC users such as General Motors Corp., according to Bruce MacDonald, who has been DEC's Xsel program director for more than five years.

A pilot program for OEMs is under way, but DEC is not yet making its Xsel available to MIS managers, said McDonald, who recently became DEC's marketing manager for the financial services industry, handing the reins for the Xsel project to Melissa Gallo.

In many cases, large users such as the Houston-based Shell Oil Co. work side by side with

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MANAGEMENT MEMO

1706 no longer seen money-maker

BY DAVID A. LUDLUM
CW STAFF

Section 1706 of last year's tax reform act is not expected to raise additional tax revenues, according to James C. Miller III, director of the U.S. Office of Management and Budget.

The tax provision, which eliminates some tax breaks formerly enjoyed by independent computer professionals by denying them their independent status, was touted as worth an additional $60 million to the federal coffers during the next five years when it was passed by Congress.

However, a more recent study by the Department of the Treasury found the bill "at best will be revenue-neutral," Miller wrote in a letter to a former college classmate who is an independent computer consultant. A copy of this letter was provided to *Computerworld*.

Section 1706 was proposed to increase the Internal Revenue Service's enforcement capabilities and lower its costs of collecting taxes by establishing salary withholding for former independent contractors while eliminating their quarterly tax filings, Miller wrote in the letter.

He added that it will be quite difficult to get Section 1706 reconsidered, as called for in several pending congressional bills, for fear of "opening the floodgates" to changes from last year's tax reform "at a time when we are trying to close the current and projected excessively large deficits."

Six state legislatures are weighing 18 bills that bear on the health and comfort of computer terminal operators, according to the Data Processing Management Association (DPMA).

The greatest concentration of activity is Massachusetts, where four House and two Senate bills are in committee. Other states weighing proposals are New York, where five are pending; California, Pennsylvania and Washington, with two proposals each; and Missouri, with one.

Five of the Massachusetts bills involve safeguards for private-sector VDT operators, along with three in New York, a pair of companion bills in Washington, one in Pennsylvania and one in Missouri that would establish fines for violations.

Joseph E. Collins, the DPMA's governmental affairs manager, said he thinks that as in past years, bills calling for health and safety standards in private businesses will be turned down. "I don't think any bills that are going to place mandates on the private sector will pass. DPMA members have given testimony stressing changes they have made, and the legislative leaders have seen that as progress," Collins said.

However, bills calling for workplace standards for government workers or for further study of the VDT health issue may be successful, Collins said.

Flextime scheduling is currently used by 30% of all businesses, double the 15% reported 10 years ago, according to a survey of 348 managers in various industries by the Administrative Management Society.

Insurers lead in flextime, with 45% of surveyed companies reporting use, along with 41% of companies providing business, employment, travel and entertainment services.

Flextime plans usually offer a "core time" when all employees must be at work along with flexible starting and quitting times. Of the companies surveyed, 83% said they require that work start by 11 a.m.

DEC configurer

CONTINUED FROM PAGE 75

DEC sales agents, mapping out potential configurations on the expert system, MacDonald said.

But placing Xsel directly in end users' hands is still under review as DEC investigates legal issues encompassing it, MacDonald noted.

DEC officials want to make sure the firm is protected should a customer receive erroneous or inadequate information from the expert system, MacDonald explained. In addition, DEC wants to prevent end users from using configuration and pricing information from Xsel as leverage with DEC's competition, MacDonald added.

IN ADDITION TO configuring VAX systems, Xsel provides preliminary computer room floor plans and generates output that can be fed into DEC's automated quote system.

MacDonald said only substantial DEC customers would find using Xsel worthwhile.

MIS managers from General Electric Co. and Electronic Data Systems Corp., for example, have hundreds of installed VAX computers and may want to reconfigure existing systems whether or not they place new orders, MacDonald said.

Acceptance of the Xsel program by OEMs points the way to a program for end users.

Currently, many OEMs depend on DEC sales representatives for configuration information, noted Jim Pompano, DEC senior consultant for the Connecticut district. OEMs usually work with several preconfigured VAXs but may want to explore the possibilities for enhancing them, Pompano said.

One DEC OEM and an early Xsel user is GE's nuclear energy operation in San Jose, Calif. The GE operation is required to receive DEC approval on VAX configurations before placing orders.

"Xsel is especially useful when we get to the last part of a proposal — when a customer would like to add one item or delete something. We can reconfigure very quickly," said Susan Schwee, GE's nuclear energy operations manager for computer product engineering.

Time saver

Without the expert system, the GE nuclear operation would spend up to four days configuring a VAX system. Now all the work can be accomplished in just one day, Schwee said.

Xsel was first implemented in 1984 as an adjunct to Xcon, an expert system that aids the VAX manufacturing process. Xcon went on-line in 1980, DEC's MacDonald said. Together, the two systems have saved the vendor a total of $25 million during a period of six years, MacDonald said.

DEC sales representatives claim a variety of benefits from using Xsel.

By using the expert configuration system, junior sales representatives have the ability to put together VAX systems as accurately as senior personnel, according to Pompano.

And even senior representatives need help, he added. "Even though they might not admit it, a senior sales rep would forget a cable or a mounting cabinet," Pompano explained. "But with Xsel, you don't have to worry about that because it will catch those oversights."

Seasoned sales representatives admit the problem.

"I was a darn good sales rep and knew my stuff, but DEC kept introducing new VAXs," recalled Sandy Mingia, DEC's western area artifical intelligence marketing manager. "Even with being a good sales rep and always making my numbers, I'll bet I made mistakes on 25% of the configurations."

Checking errors with another sales person would not prevent the problems, she noted.

"Because of the complexity — say 19 line items — there's lots of room to make little itty-bitty mistakes," Mingia said. "So getting an automated tool as a sanity check was a savior to me — to say nothing of customer satisfaction."

Productivity gains

Xsel also offers productivity gains, Mingia added. "Based on my knowledge and my experience as a DEC sales rep for four years, the configuration of a simple system could take 10 minutes and a complex one literally hours," she said.

In addtion, Xsel can offer more choices in VAX installations, observed John Moorehead, the Shell Oil account manager for DEC's Houston sales office. "You can edit to a new configuration very easily and let customers choose one that fits their needs best," he explained.

Moorehead also cited Xsel's unused capacity reporting function. "If they want to add an additional component, Xsel can tell you if the existing power supply is adequate or if there is room in the cabinet for it," he said.

The expert system also can teach users by explaining errors, Moorehead added. "The next time you won't make that same mistake," he said.

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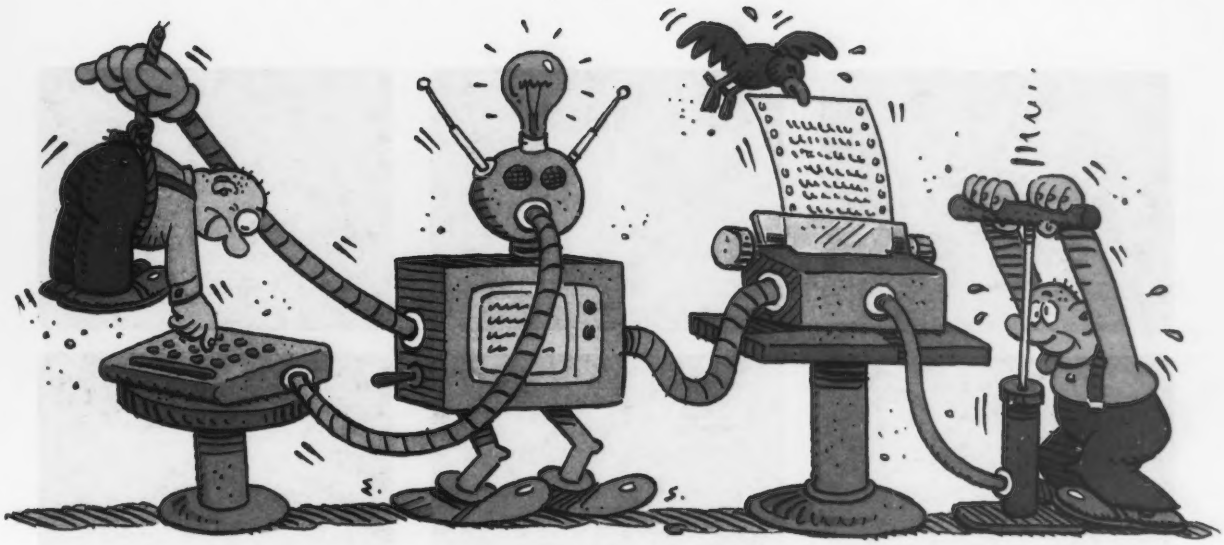

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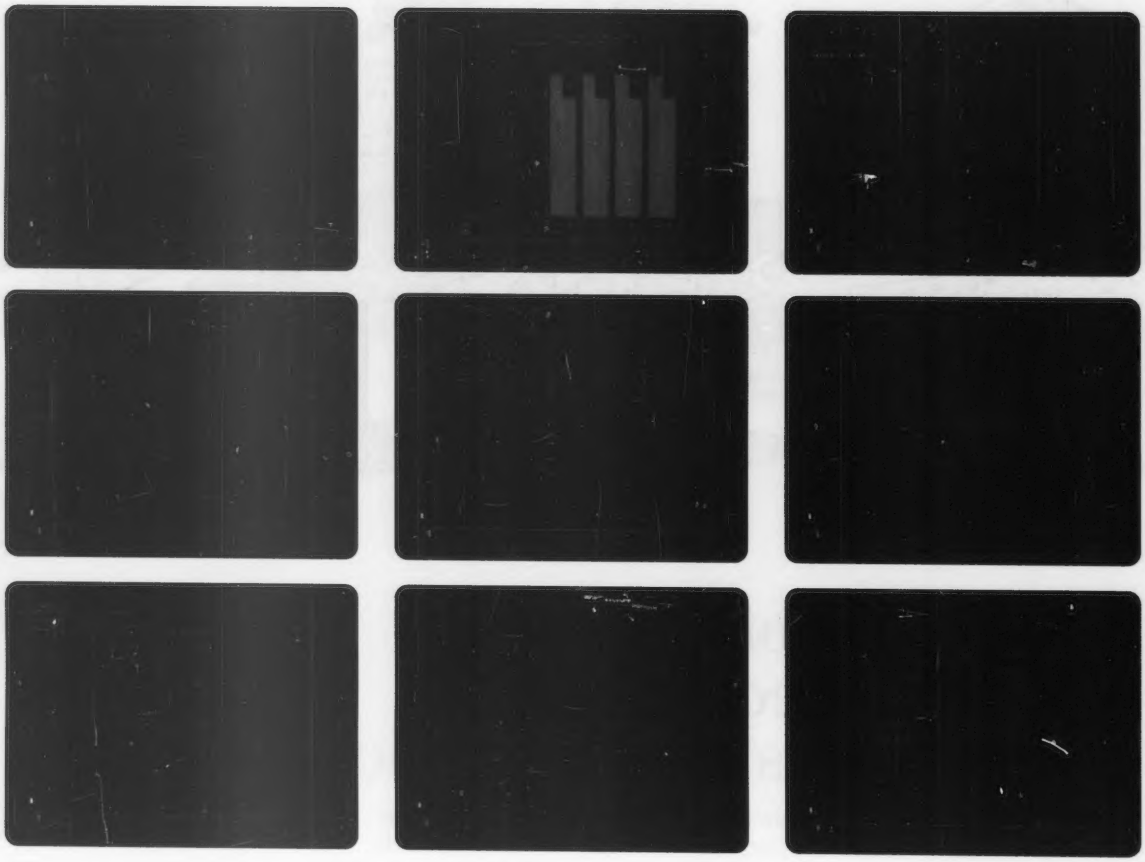

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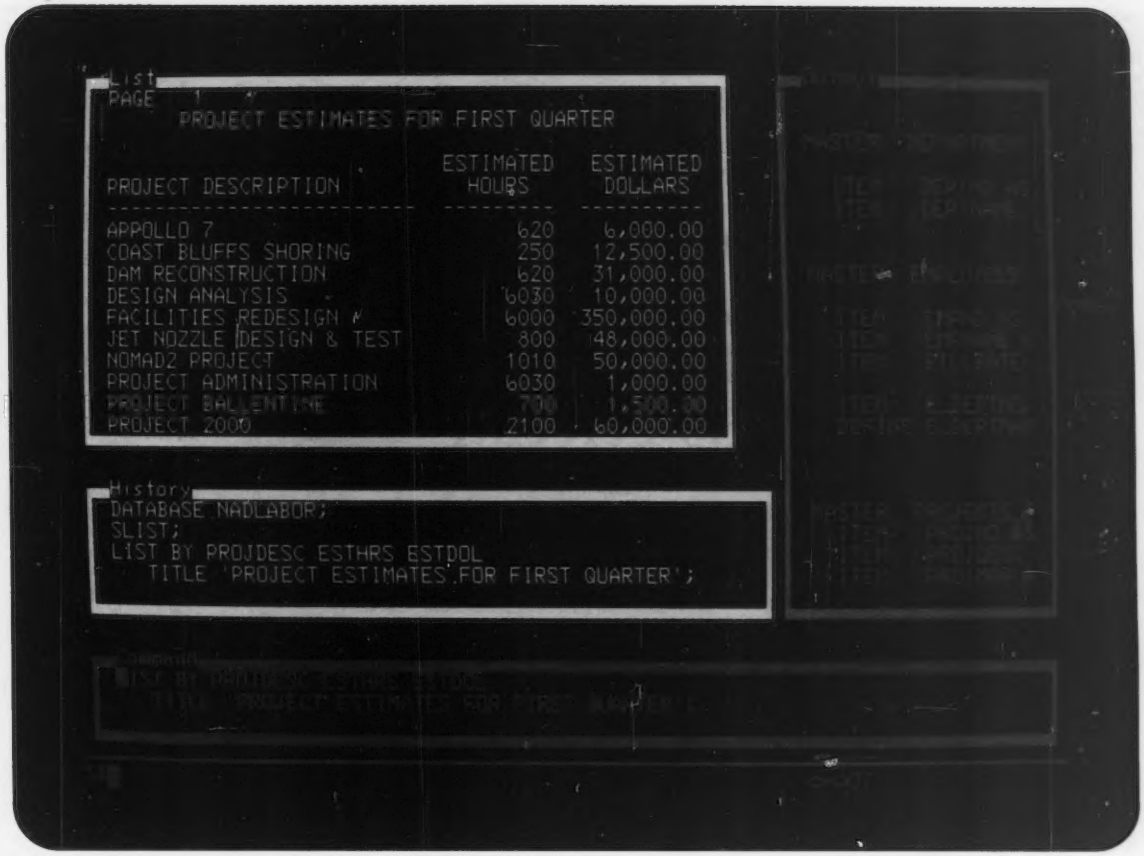

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CBT courses

FROM PAGE 75

structors with the depth of expertise required in each subject area. Another problem is the cost of developing in-house courses.

Computer-based training. Yes, there is a better way, but if I say it is computer-based training (CBT), you probably will say that you heard that same story 10 or more years ago. I know. In 1976, I worked for a postsecondary educational institution that pioneered computer-aided instruction (CAI). I supported the software that provided the design and delivery mechanisms for major segments of courses in several disciplines.

Topics were selected that either did not require large textual explanations or were explained by the instructor just prior to the drill and practice provided by CAI. But self-study, programmed learning and CAI all have failed to replace classroom education because they boil down to learning from a book, which normally means a lot of reading.

After all these years, however, CBT is starting to deliver what it promised for so long: an effective alternative to classroom education. A careful look at some of the state-of-the-art CBT just coming to market will demonstrate that the missing ingredient has finally been found — namely, that the courses be interesting if not downright entertaining.

This has been accomplished in several ways, the most important of which is the effective use of graphics. The saying "a picture is worth a thousand words" is nowhere more true than in CBT. Diagrams and other pictorial representations are available in books. But with CBT, it is possible to provide animated pictures — diagrams that move to show what is going on inside a software package.

What made the use of animation possible? The graphics capability of the IBM Personal Computer. Although the standard IBM PC is primitive by modern graphics standards, the typical IBM 3270 terminal has no graphics capabilities whatsoever. Admittedly, using the IBM PC is not a new idea in CBT. To ensure compatibility between PC and mainframe versions, no graphics were used.

Stretching dollars

An additional incentive for developing courses specifically for the IBM PC has been the realization that using the mainframe for delivering education is very expensive.

The full capabilities of the PC are now being exploited to produce very impressive and very interesting training. Techniques never dreamed of on the mainframe can now easily be done in the single-user environment of the PC.

Another important technique that is just starting to be used effectively is the simulation of the operation of the software the student is learning about. By CBT providing a controlled environment, the student can get used to the software and get a lot of assistance in using it the first time.

The type of simulation employed varies. When the topic is software with a distinctive screen format and method of operation, the screen can be displayed just as the student would see it when operating the real package. The keys function normally, but the student is restricted to the functions necessary to complete the assigned task. Any other operations offer helpful correction and advice.

When the topic is software requiring free-format input from the student, the student can be led to write the key parts of the statements. This is usually done in a fill-in-the-blank approach whereby the content of each blank is checked as it is filled in.

In summary, state-of-the-art CBT designed specifically for use on the IBM PC has become a cost-effective teaching tool through the use of interesting graphics and simulation of the subject matter being taught. It has finally come of age.

Pearkins in a technical support consultant with Software Specialists, Ltd. in Edmonton, Alberta, Canada.

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Security

CONTINUED FROM PAGE 75

The organizations with no ongoing security measures, some of which may operate in a batch mode, include larger organizations, Straub says.

Straub says the organizations may lack security because managers trust their employees or because there is a lack of support from top management. "We're talking about major commitment here whenever we implement security."

The industry groups in which organizations were most often without safeguards were medical and legal services (62%), construction (55%), wholesale and retail trade (53%), transportation (52%), petroleum (50%) and manufacturing (47%).

Of the organizations that reported incidents of abuse, about one-fifth initiated security measures after an abuse occurred, and most of them did so shortly after discovery of an incident.

However, the study found organizations are adding computer security units at a rate of about 9% a year, a figure it says has been fairly constant since 1983. This figure is up from about 4% between 1980 and 1983 and from about 2% during most of the 1970s.

Of the organizations surveyed, those with one to 10 employees devoted an average of nine man-hours a week to computer security; those with 11 to 49 employees assigned an average of 20 man-hours a week; and those with larger staffs provided 94 man-hours a week.

Of these efforts, 51% were directed toward data security, 32% toward physical security and disaster recovery, 11% toward user training and 6% toward other tasks.

Of the organizations with some security staff, 32% said they used devices to control access to data bases, 18% of them from within fourth-generation languages. Of the group, 23% used specialized software systems; of those, 61% reported using only programs purchased from vendors, 13% used programs developed in-house and 26% used both.

Of those incidents that were discovered, fewer than 10% were reported to law enforcement authorities. In interviews conducted in conjunction with the survey, respondents said they did not report the incidents because they feared they would reveal the inadequacy of their security.

Other research shows reporting abuses and the prosecution of perpetrators can discourage further incidents, Straub and Hoffer say. The lack of reporting is particularly discouraging given the attention lavished on computer abuse by the media, they say.

The study also found about half the managers (50.8%) are not convinced deterrence measures such as guidelines and education will stop employees from attempting to abuse systems, contrary to other research by Straub, although they may believe physical and software controls prevent attempts from succeeding.

The most common type of abuse reported in the survey was unauthorized use of computer service, followed by theft or abuse of data, disruption of computer service, alteration of programs and theft or other abuse of hardware.

The study found a greater likelihood of abuse among certain industry groups, particularly education, wholesale and retail trade and utilities.

Despite having larger security staffs, larger organizations reported being victims more frequently than smaller organizations.

Of the perpetrators, 81% were employees and 6% were former employees. The study found that an employee's level of system privileges is not associated with the likelihood of abuse. Those most frequently involved employees were application programmers (18%), clerical personnel (14%), other users (14%), students (12%), managers (11%) and systems analysts (6%).

The most common motives of the perpetrators were personal gain (30%), ignorance of proper conduct (26%), misguided playfulness (24%) and maliciousness (10%).

CALENDAR

MAY 31-JUNE 6

Banklink 1987 Users Conference. Nashville, May 31-June 3 — Contact: Banklink, Inc., 12th Floor, 380 Madison Ave., New York, N.Y. 10017.

ABA National Operations and Automation Conference. San Francisco, May 31-June 3 — Contact: American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

ISDN '87: Symposium on Integrated Services in Digital Networks for Telecommunications. Monterey, Calif., May 31-June 4 — Contact: Russ deWitt, Contel Service Corp., 245 Perimeter Center Pkwy., Atlanta, Ga. 30346.

Fuse '87, The National Focus Users Meeting. Palm Desert, Calif., May 31-June 5 — Contact: Fuse, Inc., Suite 4302, 450 7th Ave., New York, N.Y. 10123.

Computer Law Update. June 1-2 — Contact: Barbara Fieser, Suite 210, 8303 Arlington Blvd., Fairfax, Va. 22031.

AICPA 1987 Microcomputer Conference & Exhibition. Dallas, June 1-3

— Contact: Continuing Professional Education Division, American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, N.Y. 10036.

Seventh Annual Conference of the Association of Human Resource Systems Professionals. Minneapolis, June 1-3 — Contact: Susan G. Goldenberg, HRSP, Inc., P.O. Box 8040-A202, Walnut Creek, Calif. 94596.

Take the Lead in Data Capture. Los Angeles, June 1-3 — Contact: Data Entry Management Association, P.O. Box 16711, Stamford, Conn. 06905.

Second Guelph Symposium on Computer Conferencing. Guelph, Ont., June 1-4 — Contact: Division of Continuing Education, Room 160, Johnston Hall, University of Guelph, Guelph, Ont., Canada N1G 2WI.

Comdex/Spring '87. Atlanta, June 1-4 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

EFOC/LAN 87 — The 5th European Fibre Optic Communications and Local Area Networks Conference, Educational Program and Exhibition. Basel, Switzerland, June 1-5 — Contact: IGI Europe, Inc., Suite 200, 214 Harvard Ave., Boston, Mass. 02134.

Distributed Processing: Leveraging Architectures, Applications and the Organization. New York, June 2-3 — Contact: William Smulsky, Seminar Division, The Yankee Group, 200 Portland St., Boston, Mass. 02114. Also being held June 9-10 in San Francisco.

NTT International Symposium 87. Tokyo, June 2-3 — Contact: Nippon Telegraph and Telephone Corp.'s International Symposium 87, c/o International Public Relations Co., Shinbashi Fuji Bldg., 2-1-3 Shinbashi, Minato-ku, Tokyo 105, Japan.

10th Annual Contemporary Copyright and Proprietary Rights Issues Institute. Washington, D.C., June 3-4 — Contact: Stephen Glasser, Prentice-Hall Law & Business, 855 Valley Road, Clifton, N.J. 07013.

AI/Europa '87. Frankfurt, West Germany, June 3-5 — Contact: TCM Expositions, Ltd., 331 W. Wesley St., Wheaton, Ill. 60187.

JUNE 7-13

Adpac Corp.'s Annual Users Group Conference. Atlantic City, June 7-9 — Contact: Adpac Corp., Users Group Conference, P.O. Box 3337, San Francisco, Calif. 94119.

Annual Disc, Inc. Users Conference. New Orleans, June 7-10 — Contact: Gerald J. Markowitz, Disc, Inc., 1314 Bedford Ave., Baltimore, Md. 21208.

Insurance Accounting & Systems Association's 65th Annual Conference. Chicago, June 7-10 — Contact: Elaine Powell, IASA International Office, P.O. Box 8857, Durham, N.C. 27707.

Bar Coding Seminar Series. Atlanta, June 8-9 — Contact: Automatic Identification Manufacturers, Inc., 1326 Freeport Road, Pittsburgh, Pa. 15238.

1987 Federation of Conferences on Information Systems. Washington, D.C., June 8-10 — Contact: National Council for Education on Information Strategies, P.O. Box N, Wayland, Mass. 01778.

Seventh International Conference on Decision Support Systems. San Francisco, June 8-11 — Contact: Julie Eldridge, DSS-87, The Institute of Management Sciences, 290 Westminster St., Providence, R.I. 02903.

Sixteenth Annual Meeting of the MUMPS Users' Group. Atlanta, June 8-12 — Contact: MUG, Suite 510, 4321 Hartwick Road, College Park, Md. 20740.

ACM Tutorials for Professional Development. New York, June 8-12 — Contact: Bridget Gann, Association for Computing Machinery, 11 W. 42nd St., New York, N.Y. 10036.

Usenix Association's Annual Summer Conference and Vendor Exhibition. Phoenix, June 8-12 — Contact: Usenix Conference Office, P.O. Box 385, Sunset Beach, Calif. 90742.

Workshops on Computer-Assisted Map Analysis. Tucson, Ariz., June 9-10 — Contact: Joseph K. Berry, School of Forestry and Environmental Studies, Yale University, 205 Prospect St., New Haven, Conn. 06511. Also being held June 17-18 in Athens, Ga.; Sept. 16-17 in Corvallis, Ore.; and Oct. 24-25 in Berkeley, Calif.

ICI 1987 Annual Conference. Dallas, June 9-12 — Contact: Information Center Institute, 3772 Realty Road, Dallas, Texas 75244.

European Corporate Electronic Publishing Exhibit & Conference. Frankfurt, West Germany, June 10-12 — Contact: Paula Wertman, Interconsult, Inc., 48 Brattle St., Cambridge, Mass. 02138.

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Topic V : The Fifth Annual Security Conference for Top Secret Users). Denver, June 10-12 — Contact: Computer Associates International, Inc., 711 Stewart Ave., Garden City, N.Y. 11530.

Next Generation Information Systems: Technology for the Future. Gaithersburg, Md., June 11 — Contact: Wilma M. Osborne, B266 Technology Bldg., National Bureau of Standards, Gaithersburg, Md. 20899.

C'87: Computer — Software — Electronics. Cologne, West Germany, June 11-14 — Contact: Koln Messe, Messe- und Ausstellungs-GmbH Koln, Messeplatz 1, Postfach 21 07 60, D-5000 Koln 21, Deutz.

JUNE 14-20

Spectrum Conference on the Information and Telecommunications Systems Industry. Hyannis, Mass., June 14-16 — Contact: Jean A. Carbone, Decision Resources, Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140.

Harris Users' Exchange 1987 Symposium and Annual Meeting. Chicago, June 14-17 — Contact: Harris Users' Exchange, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

1987 Government Management Information Sciences Conference. Minneapolis, June 14-18 — Contact: Stanley F. Gabriel, Management Information Services, Room A025, Mail Code 008, Government Center, Minneapolis, Minn. 55487.

1987 IFPS Users' Association National Meeting. Washington, D.C., June 14-18. Contact: Merrill Medansky, Premark International, Room 452, 2211 Sanders Road, Northbrook, Ill. 60062.

Managing the Information Resource: Building Strategic Advantage. Lexington, Mass., June 14-19 — Contact: Annette Christensen, Suite 2381, Office of Executive Education, University of California at Los Angeles Graduate School of Management, Los Angeles, Calif. 90024.

EDP Auditors Association, Inc. 15th Annual Conference. Seattle, June 14-19 — Contact: EDPAA, P.O. Box 88180, Carol Stream, Ill. 60188.

Windows/Pagemaker Desktop Publishing Forum. New York, June 15-16 — Contact: Betsy Nagle, Hara & Associates, Suite 301, 2 Nickerson St., Seattle, Wash. 98109. Also being held June 23-24 in Los Angeles.

1987 Logic, Inc. Users' Conference. Irving, Texas, June 15-16 — Contact: Jonathan Bernstein or Susan Newberry, Grody/Tellem Communications, Inc., Suite 840, 11150 W. Olympic Blvd., Los Angeles, Calif. 90064.

Localnet East Exhibition and Conference. New York, June 15-17 — Contact: Carol Peters, Online International, Inc., 989 Avenue of the Americas, New York, N.Y. 10018.

1987 National Computer Conference. Chicago, June 15-18 — Contact: NCC '87, American Federation of Information Processing Societies, 1899 Preston White Drive, Reston, Va. 22091.

Network 90's. San Francisco, June 15-18 — Contact: U.S. Telecommunications Suppliers Association, Suite 600, 150 N. Michigan Ave., Chicago, Ill. 60601.

ISDN/87: The Third International Integrated Services Digital Networks Exposition. Atlanta, June 15-19 — Contact: Christopher Kennelly, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

Comdex International in Europe. Nice, France, June 16-18 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Office Products Exchange Network, Inc. (IBM office systems users group) Conference. Stamford, Conn., June 16-18 — Contact: Coral Aiken, Stone and Webster Engineering Corp., 7th Floor, 245 Summer St., Boston, Mass. 02107.

Flat Panel Displays 1987 International Conference. Copenhagen, Denmark, June 17-18 — Contact: International Planning Information, Nordre Ringvej 201, 2600 Glostrup, Copenhagen, Denmark.

Justifying Automation: A Survival Strategy for the Coming Decade. Detroit, Mich., June 17-18 — Contact: Steve Trombino, Robotic Industries Association, 900 Victors Way, P.O. Box 3724, Ann Arbor, Mich. 48106.

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Integrating Publishing Systems. Newton, Mass., June 23-24 — Contact: Bruce Schatzman, Xerox Systems Institute, Xerox Corp., 475 Oakmead Pkwy., Sunnyvale, Calif. 94086.

KBS 87: The Knowledge Based and Expert Systems Show. London, June 23-25 — Contact: Online International, Pinner Green House, Ash Hill Drive, Pinner, Middx HA5 2AE, U.K.

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INDUSTRY INSIGHT

Alan Alper

A sun rises in the West

Wander the streets of almost any Manhattan neighborhood, and you're bound to pass a fruit and vegetable stand owned by Koreans.

The Koreans are a hard-working, disciplined people, according to those who regard stereotypes as meaningful. They're willing to put in long hours — in some cases, 'round the clock — to succeed. Many came to this country with little to speak of, but today dominate a commodity business that, until a few years ago, was controlled by Italian and Irish immigrants.

This has occurred during boom times in their native land: South Korea, which, without question, is the Third World economic success story of the decade.

The country's industrial complex has carved out substantial positions in commodity businesses such as semiconductors, consumer electronics and automobiles. South Korea's gross national product grew almost 16% in the first quarter from a year earlier, a good portion of which was derived from computer and electronics products.

Prosperity amid dissent

Ironically, prosperity has come amid massive political dissent, which threatens to throw the country into turmoil.

Still, South Korea's major industrial concerns are beginning to flex their low-cost, vertically integrated manufacturing muscle in another commodity business — microcomputers. After a few years of testing the personal computer waters as contract manufacturers for U.S. vendors, the Koreans seem ready to claim a broader piece of the market.

The Koreans perceive a void in the U.S. PC market as IBM all but abandons the low end of the business. Like other PC makers, the Koreans realize it will be at least another year until the Personal System/2 becomes an ac-

Continued on page 92

Dove to patch leaky MCC boat

Halting withdrawals from research venture, push for 5GL top agenda

BY ALAN J. RYAN
CW STAFF

AUSTIN, Texas — When Grant Dove tackles the task of running the Microelectronics and Computer Technology Corp. (MCC) in July, one of his first tasks will be to try to convince three shareholders that are planning to withdraw from the group to reconsider their decisions.

Dove, 58, a 28-year veteran of Texas Instruments, Inc., says he will try to reverse the decision of the three companies — Allied-Signal, Inc., Unisys Corp. and Lockheed Missiles & Space Co. — that have said they will sell their shares and will not participate further in the activities of the 20-member cooperative research venture.

A fourth company, General Electric Co., has said it will continue as a shareholder but has not yet decided whether it will continue its MCC participation. An MCC spokesman says GE is considering shifting its participation to another program within MCC.

'Listening mode'

Another priority for the new chairman and chief executive officer will be to hold meetings with top-level executives and research and development managers of current shareholders. Dove says he will solicit from them their views on the concept of MCC and will ask how well the consortium is meeting their needs. "I'll be in a listening mode," he adds.

The enthusiastic Virginia native, who calls himself an internationalist because he travels so frequently, is also ready to sell other companies on the idea of MCC.

Prospects Dove plans to concentrate on include the semiconductor, data processing and defense large-systems design fields and companies that make specialized workstations. "In general, we serve the entire microelectronics and computer industry, and I think we have something that would be of interest to most of those companies," he says.

"There are many . . . companies that will need high-technology fifth-generation foundation programs for their future products," Dove adds. MCC started with seven discrete programs after being chartered in 1982.

Four of those programs were later combined to form what is now the advanced computer ar-

Continued on page 94

AMD asks for $1B in Intel suit

BY ALAN J. RYAN
CW STAFF

SANTA CLARA, Calif. — Advanced Micro Devices, Inc. (AMD), claiming that Intel Corp. has not lived up to its end of a 10-year technology exchange agreement, has reportedly asked a court-appointed arbitrator for either $1 billion in damages from Intel or a transfer of technology and $100 million.

According to industry sources, AMD has claimed its agreement with Intel covered any Intel multiple processor units developed during the life of the agreement. Once the deal is terminated, one analyst said, AMD would be entitled to any technology exchanged during the contract period. But Intel reportedly has said it never agreed to share 386 technology.

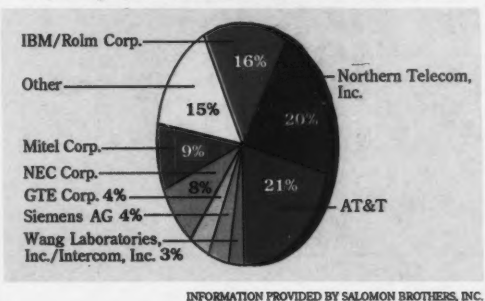
One industry analyst said AMD could stand to lose a great deal if the dispute is settled in favor of Intel and that most of AMD's revenue is generated through its second-sourcing of product lines.

Neither company would comment directly on the issue, saying that they have agreed not to discuss the matter in public.

Data View

U.S. private branch exchange market, 1986

The five largest firms controlled 76% of the $3.73 million market



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CW CHART

HP earnings on target

BY ALAN J. RYAN
CW STAFF

Analysts said last week that earnings for Hewlett-Packard Co.'s second quarter were in line with expectations, while Ashton-Tate's first-quarter earnings were a bit soft but not alarming.

In Palo Alto, Calif., HP reported a 13% hike in sales and a 28% increase in earnings for the period ended April 30.

Orders in the quarter were up 20% from the same period for

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Inside

- Iomega class-action suit settlement gets preliminary OK. Page 90.
- Chip honchos outline Sematech plans. Page 91.

PC-geared net tools lead Sytek diversification

BY PATRICIA KEEFE
CW STAFF

MOUNTAIN VIEW, Calif. — In an effort to diversify its revenue base and shore up a sagging profit line, Sytek, Inc. is readying a family of personal computer-oriented networking products for introduction this summer, a spokesman said recently.

"Our goal is to attach [islands of] subnets, which use different protocols and media, into the larger overall corporate network," Sytek spokesman Stuart McFaul said. Sytek will offer bridges and gateways as the means by which these networks are linked, he added.

The PC market represents a significant departure for Sytek, which has traditionally focused on much larger networks tied into larger systems. "There is definitely a move toward providing smaller networks," McFaul said.

Loss drove change

Fueling this change in strategy was a major loss recorded in Sytek's last quarter ended in February. The privately held broadband vendor was forced to layoff 46 workers in an effort to streamline operations.

Sytek has attributed the loss to a double whammy: a softening in the asynchronous terminal-to-host market, which represents 50% or more of its revenue, and the loss of an OEM contract to manufacture adapter cards for IBM's PC network. The IBM deal represented 49% of Sytek's revenue in fiscal 1986, McFaul said.

"That 49% was and is tough to replace," he said, adding that Sytek "will never execute a contract with another company that would account for nearly as large a part of [Sytek's] revenues." Meanwhile, Sytek is looking to compensate by focusing on end-user sales.

The company was successfully adjusting to the loss of IBM's business, but then the terminal-to-host market unexpectedly softened. "It was an unfortunate thing," McFaul said. Once again, Sytek's game plan calls for adjustment. Although there are no plans to abandon its most profitable market, Sytek will devote fiscal 1987 to diversification, adding Ethernet and possibly Starlan to its product offerings, McFaul said.

"I think it's fair to say the terminal area is gradually being replaced by the PC, which offers insight into the PC-based solution we [will offer]," he added.

Adding to the cloud over Sytek is a recent decision by majority shareholder and early inves-

Continued on page 90

* Power Backup Unit (PBU) optional on tower 32-800

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NCR

Court approves Iomega class action

BY ALAN J. RYAN
CW STAFF

ROY, Utah — Iomega Corp. announced recently that the District Court of Connecticut had entered its preliminary approval of a settlement agreement relating to the class action and derivative action pending against the company and some of its directors. The actions stemmed from Iomega's failure to meet its projected sales and earnings for fiscal 1986.

Under the settlement agreement, Iomega would pay the plaintiff class $250,000 plus an additional $750,000 under mutually agreed upon terms and conditions. The company would also issue a total of 1.2 million shares of a new class of Series A convertible preferred stock that, under certain conditions, would become convertible into common stock of the company.

The settlement is subject to notification of all members of the plaintiff class and final court approval, a company statement said.

The company's results of operations for the second quarter of 1987 will reflect a charge for the settlement.

For its first quarter ended March 29, Iomega posted a loss of almost $17,000, or $1.15 per share, on sales of $16.6 million. In the like quarter last year, Iomega had income of $4.57 million, or 30 cents per share, from sales of just more than $35 million.

The decrease in sales was attributed to a reduction in sales to distributors that were working down an overstocked condition in Bernoulli Box products, according to Michael Kucha, chief executive officer.

Analyst James Stone of Shearson Lehman Brothers, Inc. said Iomega flooded its dealer channel with too many products in December 1986, creating excess inventory.

Layoff woes

In early March, Iomega announced a 183-employee permanent reduction in its work force and a 182-worker temporary layoff. Those cuts followed a 150-worker reduction in December 1986. At that time, analysts predicted that Iomega would suffer a 10 to 30 cents per share loss for the period.

One analyst who follows the developer and manufacturer of cartridge-based disk mass-storage products said the recent quarterly results show that Iomega "is moving far too slowly from the old [Bernoulli Box] product to its new product. Based on losses and the need for cash, this company is in serious trouble."

But Stone said that while sales were lower than expected, a healthier current quarter is expected. "In my last conversation with the company, they said they were looking for revenue in the $20 million range this quarter. Right now, they're going through a product transition."

Sytek

FROM PAGE 87

tor General Instrument Corp. in New York to divest itself of a 57% stake in the company.

As part of a corporate restructuring, General Instrument decided to divest itself of holdings in several subsidiaries unrelated to its core businesses, including Sytek.

General Instrument has denied reports that Sytek was unprofitable, and Sytek has referred all questions concerning the stock sale to General Instrument.

Ed Kearney, General Instrument's vice-president of investor relations, stressed that his firm's decision to divest should not reflect negatively on the company.

"We think very highly of Sytek," Kearney said.

A number of companies have expressed interest in purchasing the Sytek stock, but Kearney declined to identify them or to say whether prospective buyers are in the networking business.

HP earnings

CONTINUED FROM PAGE 87

1986, the company said.

Sales for the quarter totaled $2.02 billion, up from the $1.78 billion recorded in the like quarter in 1986. Revenue from U.S. sales and service was $997 million, up 8% from the same quarter last year. The company's international sales rose 19% to $1.02 billion.

Earnings were $162 million, or 63 cents per share. In the second quarter last year, earnings of $127 million, or 49 cents per share, were reported.

John A. Young, HP's president and chief executive officer, attributed the increases in part to the company's new product cycle and a rebound in the computer industry. He said orders for HP's peripheral, network and component products have been increasing.

Analyst Peter Heymann of Drexel Burnham Lambert, Inc. said that while HP's expense control could have been better in the quarter, "in general, the quality of earnings was very good. There were no unusual factors in the overall earnings report."

Heymann said that the breadth of orders in the U.S. has improved. "We saw a double-digit increase for the first time since the last cycle in the electronics industry" about four years ago, he said.

For HP's third quarter, Heymann forecasted a small sequential improvement. "We'll see something more in the 5% range," he said. At its current earnings run rate, Heymann said HP "is still going to score substantial improvement in its bottom line for fiscal '87."

Ashton-Tate, the Torrance, Calif.-based marketer of data base management systems, word processing, graphics and integrated software, reported income for its quarter ended April 30 of $9.09 million, a 77.5% increase on income of $5.12 million for the same period last year.

Earnings were 36 cents per share, compared with 23 cents per share for last year's first quarter. Sales for the period were $60.21 million, up 46.2% from the $41.17 million reported for the first quarter last year.

Ashton-Tate's earnings were in line with expectations, said analyst Bob Therrien of Paine Webber, Inc. "If anything, I think the earnings were a little bit conservative this time," he said.

Charlotte Walker, an analyst with L. F. Rothschild, Unterberg Towbin, said a careful analysis of the numbers reveals that they were "a little soft in some areas," but "it's nothing to be alarmed about.

"Revenues of $60 million were down a couple of million from the fourth quarter, [which is] going against the trend set by Microsoft Corp. and Lotus Development Corp. of sequential improvement in the first quarter."

Walker said it was noteworthy that domestic sales for the period were down 13% from the January quarter, while international sales accounted for 30% of the recent quarter's sales. She said the Multimate product slowed in growth sequentially.

Ashton-Tate Chairman and CEO Edward Esber Jr. said the firm has made its products available on 3½-in. disk formats to run on the IBM Personal System/2 family, which "is just the first step in our plan to optimize our products to take full advantage of these new systems."

Firms chip in for Sematech

BY JAMES A. MARTIN
CW STAFF

DALLAS — Semiconductor executives meeting here recently outlined an operating plan for Sematech, the U.S. chip-manufacturing consortium, that included raising $250 million a year from private industry and government funds.

Sematech is the planned cooperative effort among U.S. semiconductor companies to combine manufacturing technology and experience in an effort to combat Japanese and other offshore competition.

The plans were developed by a Semiconductor Industry Association task force that appointed itself as interim board of directors for Sematech and said it would immediately begin efforts to raise $125 million per year from the electronics industry.

Matching funds will be sought from the government, with a provision that federal aid be restricted to six years.

Although the board did not specify from which agencies they expect funding, the Department of Defense has already shown great interest in the consortium.

A search for a manufacturing site will begin immediately, as Sematech's plans include producing its first chips by late 1988.

"We believe it is absolutely essential that Sematech gets launched without delay to stop the erosion of America's semiconductor industry by subsidized foreign competitors," such as Japan, said Charles E. Sporck, president of National Semiconductor Corp. and chairman of the Sematech committee.

Some have compared Sematech — in theory — with Microelectronics and Computer Technology Corp., better known as MCC, an Austin, Texas-based cooperative focusing on developing new, shared technologies among competitive companies. However, Sematech most likely has a better chance of success than MCC, according to Edward C. White Jr., a semiconductor analyst with E. F. Hutton & Co. in New York.

Sun moves to buy Trancept for $5M

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. last week announced it has signed a letter of intent to acquire Trancept Systems, Inc. for approximately $5 million in Sun common stock.

The acquisition is subject to approval and execution of a definitive contract, regulatory approvals and approval by Trancept shareholders.

Trancept is a privately held company that develops and sells applications and graphics-accelerator products. It supplies TAAC-1, which it claims increases the performance of computation- and graphics-intensive work in applications such as geometric modeling, medical imaging and broadcast animation.

Sun supplies distributed computing systems, including workstations and servers, networking and data communications products and Unix system software.

Sun rises

FROM PAGE 87

cepted standard.

Two Korean manufacturers already have equity stakes in their respective U.S. sales partners. Daewoo Telecom Co., South Korea's pioneering microcomputer maker, has purchased a controlling interest in Cordata. Hyundai Electronic Industries, Ltd. owns a piece of Blue Chip Electronics, Inc. in Chandler, Ariz.

Two other firms, Lucky-Goldstar Group and Samsung Co., have begun marketing PCs under their own names. Rumors abound that Hyundai is setting similar marketing plans as well.

And why not? Brand recognition has become the name of the PC game. Hyundai has won accolades for its automobiles. Samsung and Lucky-Goldstar have become recognized names in consumer electronics. Like the Japanese, the Koreans do not like to put their own names on a product unless it has a better-than-even chance of winning. Perhaps they smell a winner?

Preparing for the worst

Meanwhile, the Koreans' U.S. sales partners are probably preparing for the worst.

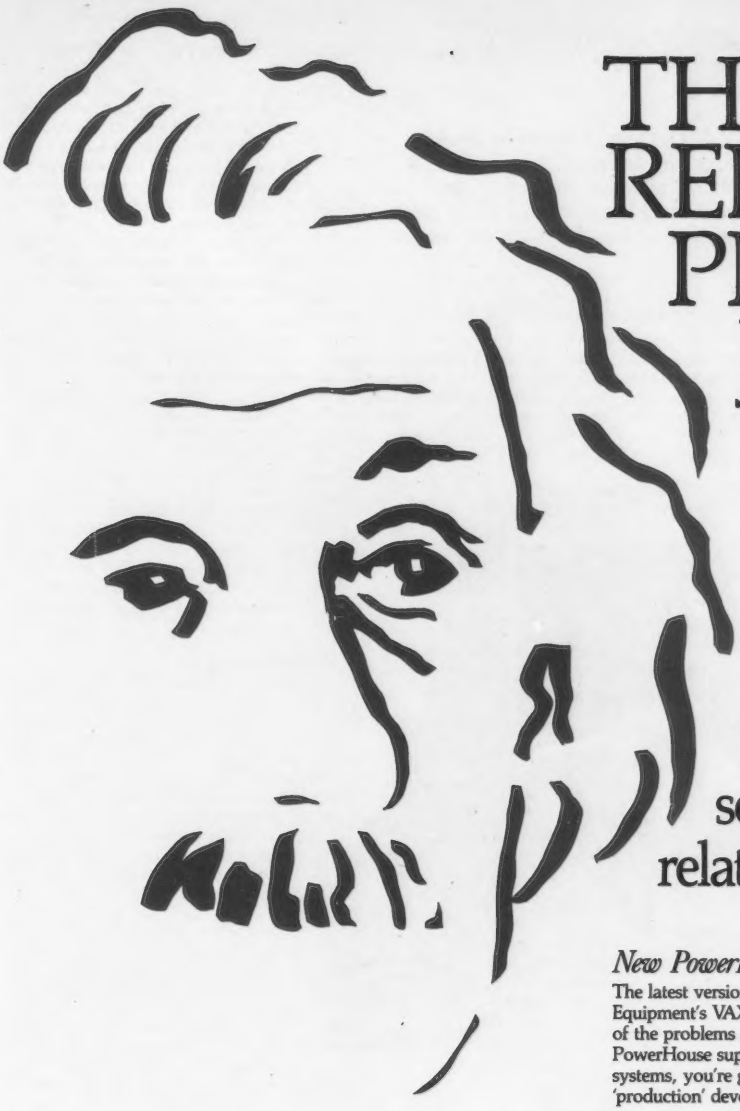
Start-up Blue Chip Electronics shipped 30,000 PCs last year, according to Framingham, Mass.-based market researcher International Data Corp. (IDC). The company has an exclusive relationship wth Hyundai on two products, the PC Popular — an IBM PC XT-class machine with a speedier microprocessor, priced at $499 — and its entry-level Blue Chip PC.

Leading Edge Hardware Products, Inc. in Canton, Mass., — which last year shipped 185,000 Model D IBM PC-compatible computers made by Daewoo, according to IDC — has to be questioning the impact of its supplier's ownership position in Cordata. Leading Edge has an exclusive relationship with Daewoo through 1989.

Even if the Koreans attempt to have a go at it themselves, U.S. vendors need not fear. Some other country is bound to materialize, offering cheap labor rates and technological expertise. Moreover, the Koreans still have to strengthen their U.S. distribution channels and learn how to work with resellers here.

One thing is for sure: PC prices will continue to plummet, bringing lower cost computers to the masses. That's good news for consumers but bad news for domestic suppliers.

Alper is *Computerworld*'s Mid-Atlantic bureau correspondent.



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COGNOS

MCC's Dove

CONTINUED FROM PAGE 87

chitectures program.

"In general, I think [the participating companies] are working on the right problems," Dove says. "We'll probably make some adjustments, and we're looking at some new programs — which would be in some areas to augment the ones that we have and, perhaps, attract some new shareholders." He will not discuss any future programs but does say that "fifth-generation technology will be very important to our long-range plans.

"The so-called fifth-generation technology — symbolic processing and artificial intelligence — is inherent in almost all of our programs here. In six or seven, it is either the driving force toward which the research is directed or it is being used as a development tool or productivity tool," Dove says.

> "THE SO-CALLED fifth-generation technology — symbolic processing and artificial intelligence — is inherent in almost all of our programs here. In six or seven, it is either the driving force toward which the research is directed or it is being used as a development tool or productivity tool."
>
> GRANT DOVE
> MICROELECTRONICS AND COMPUTER TECHNOLOGY CORP.

"American companies have been the leading technology provider for the first four generations. If MCC can play a small role in making American industry a continuing leader in fifth-generation technology, then we will have accomplished our purpose," he adds.

According to Dove, the research being done at MCC is one way to help the American computer industry to more effectively compete with the Japanese. However, he said, "Our job is to keep our eyes on what we need to do and give ourselves more capabilities."

He added, "I think it's important to show that this does work, and that it makes money for our shareholders."

But Dove is approaching his new job with a mix of optimism and caution. He says he has worked closely with interim CEO Joseph Boyd to adjust growth rates and control expenses to be sure MCC will not overshoot its budget for 1988 in the event that additional shareholders are not secured. He says things seem to be reasonably secure, as there are 16 companies that have committed to the consortium for next year.

For the job recruitment firm hired by MCC to find a new leader, Dove seemed a likely choice because of his management and R&D experience. The firm pursued him, although Dove claims he was not looking for a new job, and he agreed to an interview.

Diverse duties

During his tenure at TI, Dove has worn many hats. Currently, he is executive vice-president, with duties including the management of Geophysical Service, Inc. and corporate development, which includes TI's central R&D activities, strategic planning and economic analysis.

Since his appointment was finalized in early March, Dove has been devoting one or two days each week to MCC, acting as a consultant to the consortium until his term goes into effect. In July, he will take the MCC helm full-time.

Meanwhile, he spends his MCC time looking back at the original documentation that led to the founding of MCC to see whether the group is meeting its original goals. "We're in the process of seeing how well we're doing in terms of the near-term objectives that we've set and where we should be in 1990, 1995 and 2000. I feel pretty good about what they've done," he says.

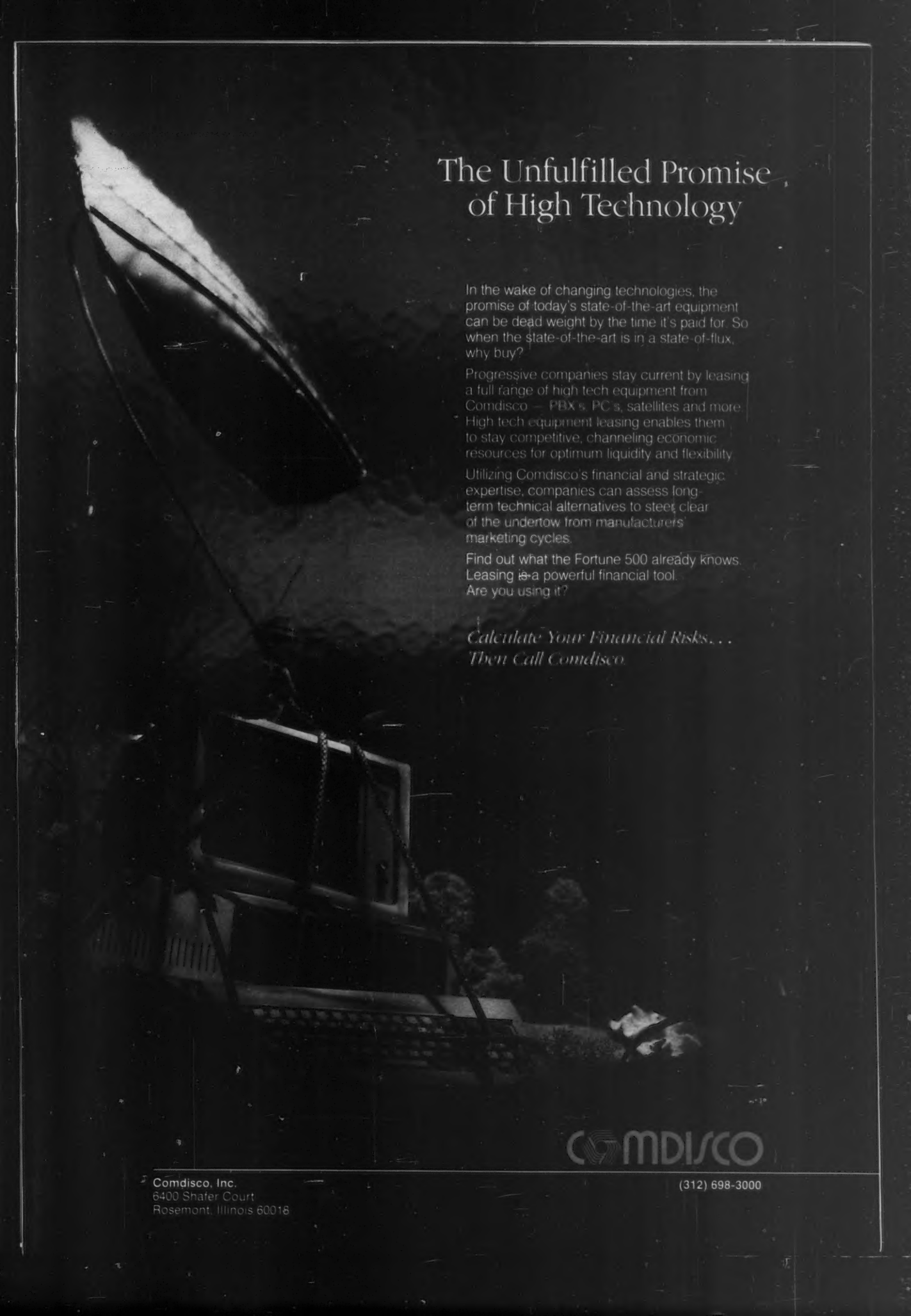
Still making technology inroads

Critics of the consortium have said that the group has yet to make any major technological advancements. But Dove is quick to point out that in this year alone, there have been technology transfer announcements, such as an electronics technology transfer currently being used in a new laboratory set up by Boeing Electronics Co.

MCC has long-range goals for each of its R&D programs; the shortest one is six years from the time research started. However, Dove says, "They had planned early spin-outs of along-the-way technology, and those are happening in computer-aided design. We'll have some significant shipments of capabilities for beta test this year."

Some critics have said MCC is not showing much gain on foreign competition. "MCC is aimed at helping American companies and American industries become more competitive in the world market," Dove says. "We watch very carefully what the international companies are doing, but we are not hung up on that."

The appointment of Dove concludes a search conducted by a five-member committee of MCC's board of directors, chaired by John Lacey, executive vice-president of Control Data Corp.



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BY NANCY BLUMENSTALK MINGUS
SPECIAL TO CW

The Want Ad reads: "Bachelor's degree required." Is it? Rarely. The ad continues: "Three to five years Cobol programming in a VM/CMS, CICS, IDMS environment." Really? Probably not. "Two years supervisory experience necessary." Will they dicker? Maybe.

Seldom is there a perfect person for the job. Managers today look for a good fit between job and candidate, but this attitude does not mean an exact match to the job specifications. Lacking education, technical expertise or management experience does not necessarily pose the blockades most MIS professionals assume it does.

Many job seekers overemphasize education. Entry-level jobs are the only ones that absolutely require a four-year degree. For example, for a programmer trainee, "that degree is their only credential," says Laurence Brody, senior vice-president of systems for Manufacturers and Traders Trust Co. in Buffalo, N.Y. In fact, as experience increases, a degree becomes less important. Once a person achieves 10 or more years of experience, a degree is generally irrelevant. Philip Nichols, national services manager for Cullinet Canada, Inc., says a degree "only proves that you have spent the time." Pursuing a degree is still personally rewarding and beneficial when considering a career change. But candidates should not expect an automatic impact on the job.

As an alternative to a four-year degree, many MIS professionals are turning to certifications such as the Certified Data Processor (CDP) and Certified Systems Professional (CSP) programs offered by the Institute for Certification of Computer Professionals in Chicago. Unfortunately, at least in the business world, these certifications are not widely recognized as valid credentials. Many managers are not even aware of the requirements for a CDP or CSP certificate. If they are, they use them more to "show a seriousness about an MIS career, not as a measurement of what you know," says Richard Beldon, data processing placement counselor for Robert Half of Buffalo.

Academia, on the other hand, pays more respect to the certifications. Colleges and universities often view a CDP certificate as equivalent to a master's degree when they hire professors.

Technical experience is crucial in technical positions, yet specific product experience may not be. For example, a person with strong Cobol skills can program on an IBM system or a Digital Equipment Corp. VAX with minimal adjustment. If a person has the "correct perspective on an overall job approach and is willing to grow and develop," Nichols would hire that person, he says, then "round them out once they're on board."

Job seekers with no management experience would not be as fortunate, however. "I would not hire someone into a management job without experience. I might bring them in at another level and promote them. I don't want someone to discover his management style here," Nichols says.

On the other hand, other companies are more willing to consider informal management training. "All of us have some management experience," Brody says. "Someone who had supervised three to eight people could manage 10 to 15. If I'm hiring someone to supervise two to three people, prior supervisory experience is not essential."

Drafting the resume

Even though managers are willing to accept people with some gaps in education or experience, MIS professionals must still present themselves in a positive light. Several criteria will help MIS professionals fill gaps in their resumes by stressing the experience they possess.

What really sells MIS managers is the candidate's achievements. For example, Brody says he checks to see if the person "has a clear record of accomplishment and has been recognized for it. That is, promotions within a shop, not from external job switches." The resume should stress major accomplishments for each position held, while pointing out any internal promotions. List any professional affiliations. Leadership in MIS organizations can be advantageous. "If a person has no opportunity to demonstrate management on the job, management outside the job can demonstrate the same potential for leadership," Brody says.

Strong communication skills are also highly valued. Although many managers, like Nichols, prefer to learn about communication skills in a "good, long, old-fashioned interview," candidates should list any published pieces or presentations on their resumes.

The last information to include is education. List colleges only; high schools are not important. If applicable, add any recent courses taken at schools or technical institutes that did not count toward a degree but provided additional hardware and software experience.

Once the resume is ready, should it be printed or typed? Printed resumes tend to imply holes being covered by fancy print. They are also less flexible and less specific to the position being sought. "They're a waste of money," Beldon says.

With the resume prepared, the candidate should approach the interview cautiously. "We all try to put ourselves in the best light, but there is a point where self-promotion can become misrepresentation," Brody says. "It's the responsibility of the hiring company to confirm skills, but it's the applicant's duty not to mislead. If someone knowingly misrepresented his experience, my inclination would be to reverse the hiring mistake."

MANY job seekers overemphasize education. Entry-level jobs are the only ones that absolutely require a four-year degree. For example, for a programmer trainee, that degree is their only credential.

Blumenstalk Mingus is a free-lance writer based in Buffalo, N.Y.

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- Experience in creating and maintaining programmer level documentation including:
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- Perform QA alpha testing
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Senior Programmer Analysts for life insurance company. Maintain and develop valuation systems and life insurance systems, liaison with actuarial department. Bachelor Degree in Computer Sciences, or scientific field such as Mathematics, Chemistry, Engineering. 3 years experience. Must have reached Level 2 of actuarial exams, or have 2 years experience utilizing actuarial formulas. Experience with Cobol, Assembler, Command Level CICS. $39,000 per year. Job site Los Angeles, California. Please send resumes to Job # SC4148, PO Box 9560, Sacramento, California 95823-0560 not later than June 11, 1987.

PROGRAMMER: Extract census data from U.S. Census Bureau corporate tapes using CENSPAC & COBOL for use by budget analysts & agencies. Develop software using PASCAL on an IBM-AT to automate demographic programs in population, labor force & household projection. Develop programs using BASIC to automate yearly budget book production. Modify programs for improved efficiency. Assist budget analysts in using IBM-AT PC. Requires MS in Computer Science. Education to include BASIC, COBOL, & PASCAL & the use of IBM-AT PC in conjunction with IBM mainframe. Hrs: 8:30AM-5:00PM. 37.5 hrs./wk. $22,000/yr. Central Illinois location. Send resume to: Illinois Dept. of Employment Security, 924 E. Adams, Springfield, IL 62705, Attn: Chuck Mowry, Ref # 012167066. AN EMPLOYER PAID AD.

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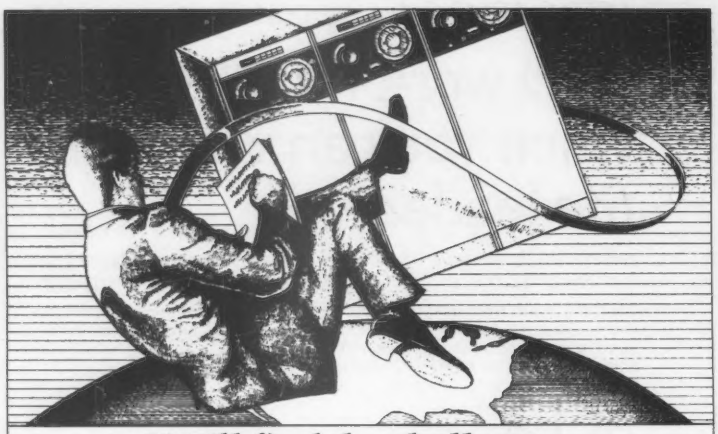

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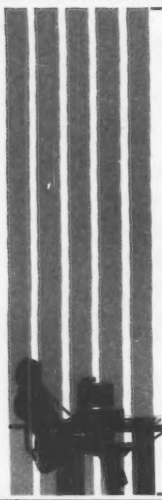

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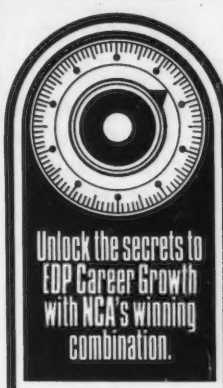

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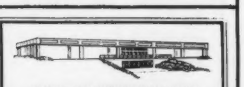

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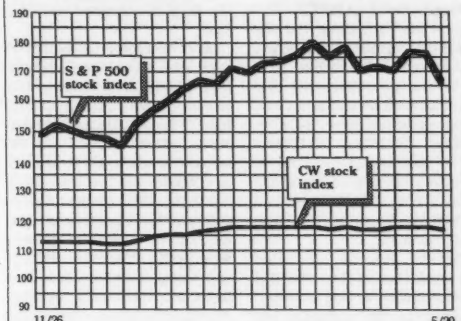

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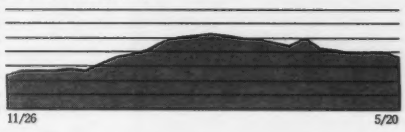
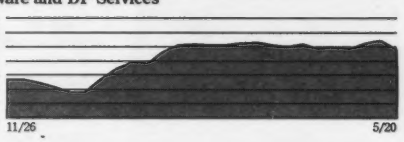
Computer Systems

Supplies and Accessories



Software and DP Services



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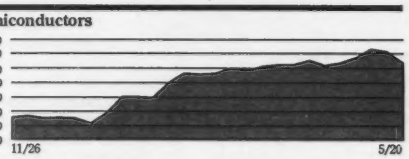

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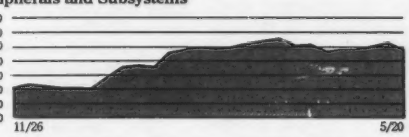
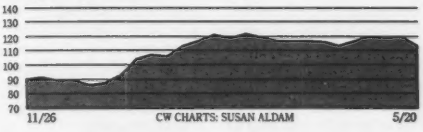


Leasing Companies



CW CHARTS: SUSAN ALDAM

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 20, 1987

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Systems

EXCH		52-WEEK RANGE (1)		CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	7	4	4.25	-0.1	-2.9
O	ALTOS COMPUTER SYS	18	10	12.75	+0.1	+1.0
A	AMDAHL CORP	42	15	34.38	-6.1	-15.1
O	APOLLO COMPUTER INC	25	9	21.88	-1.5	-6.4
O	APPLE COMPUTER INC	82	30	74.50	-4.0	-5.1
N	AT&T	28	22	25.00	-1.1	-4.3
O	C P T CORP	6	3	3.31	-0.4	-11.7
N	COMPAQ COMPUTER CORP	51	12	44.25	-3.4	-7.1
A	COMPUTER CONSOLES INC	12	7	10.00	-0.4	-3.6
O	CONCURRENT COMP CORP	19	11	17.25	-1.3	-6.8
N	CONTROL DATA CORP	35	20	31.00	-2.5	-7.5
O	CONVERGENT TECH	12	4	6.38	+0.4	+6.3
N	CRAY RESH INC	136	69	108.50	-6.0	-5.2
O	DAISY SYS CORP	14	8	8.75	-0.5	-5.4
N	DATA GEN CORP	42	25	33.75	+1.3	+3.8
N	DATAPOINT CORP	9	4	5.00	-0.1	-2.4
N	DIGITAL EQUIP CORP	175	81	155.38	-10.9	-6.5
N	FLOATING POINT SYS INC	39	11	10.88	-0.6	-5.4
N	GOULD INC	24	15	17.00	-0.8	-4.2
N	HARRIS CORP	43	27	37.38	-4.3	-10.2
N	HEWLETT PACKARD CO	65	36	62.00	-1.3	-2.0
N	HONEYWELL INC	84	58	75.38	-3.5	-4.4
N	IBM	168	116	156.63	-9.6	-5.8
O	IPL SYS INC	4	2	3.00	+0.0	+0.0
N	ITT CORP	66	44	50.63	-3.5	-6.5
N	M A COM INC	18	12	13.50	-0.6	-4.4
N	MATSUSHITA ELEC INDL LTD	136	77	120.25	-0.3	-0.2
O	MENTOR GRAPHICS CORP	34	11	27.38	-4.1	-13.1
N	NBI INC	14	8	10.63	-0.3	-2.3
N	NCR CORP	77	42	70.75	-4.8	-6.3
N	PRIME COMPUTER INC	30	16	25.13	-3.0	-10.7
O	STRATUS COMPUTER	41	18	37.00	-2.5	-6.3
O	SYMBOLICS INC	14	4	4.50	+0.3	+5.9
O	TANDEM COMPUTERS INC	75	28	73.75	+0.0	+0.0
N	TANDY CORP	56	31	38.75	-1.6	-4.0
N	TEXAS INSTRS INC	203	103	172.75	-12.8	-6.9
A	ULTIMATE CORP	35	13	22.25	-1.6	-6.8
N	UNISYS CORP	125	58	113.25	-4.5	-3.8
A	WANG LABS INC - B	19	11	16.63	-1.8	-9.5
A	WANG LABS INC - C	19	11	16.63	-1.5	-8.3
N	XEROX CORP	81	49	73.50	-5.6	-7.1

Supplies & Accessories

EXCH		52-WEEK RANGE (1)		CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMER BUSINESS PRODS	33	23	28.50	-0.4	-1.3
N	BARRY WRIGHT CORP	24	14	18.00	-1.3	-6.5
A	DUPLEX PRODS INC	22	18	18.75	-0.4	-2.0
N	ENNIS BUSINESS FORMS INC	23	14	19.88	+0.3	+1.3
N	3M CO	140	99	127.00	-2.8	-2.1
N	MOORE LTD	27	20	23.25	-1.4	-5.6
O	STANDARD REGISTER CO	53	32	44.00	+0.0	+0.0
N	WALLACE COMPUTER SVCS	50	37	43.00	-1.6	-3.6

Software & DP Services

EXCH		52-WEEK RANGE (1)		CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	7	3	4.50	+0.0	+0.0
N	ADVANCED SYS INC	22	12	18.38	-1.0	-5.2
N	AGS COMPUTERS INC	45	17	41.00	-1.8	-4.1
O	AMERICAN MGMT SYS INC	38	13	35.75	-1.5	-4.0
O	AMERICAN SOFTWARE INC	22	7	15.75	-2.5	-13.7
N	ANACOMP INC	9	3	7.75	-1.0	-11.4
O	ANALYSTS INTL CORP	11	4	9.50	-0.3	-2.6
O	ASHTON TATE	30	10	24.75	-3.0	-10.8
O	ASK COMPUTER SYS INC	17	9	12.25	-1.3	-9.3
O	ASTRADYNE COMP IND	3	1	1.22	-0.1	-7.2
N	AUTOMATIC DATA PROC	51	29	42.88	-3.0	-6.5
O	BOOLE & BABBAGE INC	11	4	9.50	+0.5	+5.6
N	COMPUTER ASSOC INTL INC	28	10	25.38	-1.1	-4.2
O	COMPUTER HORIZONS CORP	15	10	12.75	-0.4	-2.9
O	COMPUTER NETWORK TECH	9	4	4.75	-0.7	-12.7
N	COMPUTER SCIENCES CORP	61	30	49.88	-3.4	-6.3
N	COMPUTER TASK GROUP INC	19	11	15.50	-0.8	-4.6
O	COMSHARE INC	18	11	15.50	-1.3	-7.5
N	CULLINET SOFTWARE INC	16	6	10.50	+0.0	+0.0
O	CYCARE SYS INC	17	7	8.00	+0.0	+0.0
O	DUQUESNE SYS INC	33	12	26.00	-2.0	-7.1
N	GENERAL ELEC CO	113	71	100.00	-4.0	-3.8
N	GENERAL MTRS CORP (CLASS E)	49	24	40.75	-2.3	-5.2
O	HOGAN SYS INC	17	9	15.38	-0.8	-4.7
O	INFORMATION SCIENCES INC	4	1	1.00	-0.1	-11.1
O	INFOTRON SYS CORP	17	7	10.50	-0.5	-4.5
N	KEANE INC	16	5	9.00	+0.1	+1.4
N	LOGICON INC	38	22	27.13	-1.4	-4.8
O	LOTUS DEV CORP	37	9	31.88	-3.4	-9.6
O	MANAGEMENT SCI AMER	21	12	12.13	-1.0	-7.6
O	MDBS INC	11	5	6.38	-0.3	-3.8
O	MICOM SYS INC	18	10	15.00	-2.0	-11.8
O	MICRO PRO INTL CORP	8	2	7.25	+0.9	+13.7
N	MICROSOFT CORP	128	26	109.50	-12.3	-10.1
O	NATIONAL DATA CORP	27	16	22.13	+0.1	+0.6
N	ON LINE SOFTWARE INT	24	10	26.50	+0.0	+0.0
O	ORACLE SYS CORP	30	7	24.00	-3.3	-11.9
N	PANSOPHIC SYS INC	23	12	19.00	-3.1	-14.1
O	POLICY MGMT SYS CORP	30	15	23.50	-1.5	-6.0
O	PROGRAMMING & SYS INC	13	8	10.50	+0.3	+2.4
O	REYNOLDS & REYNOLDS CO	42	27	34.25	-1.3	-3.5
O	SCIENTIFIC COMPUTERS INC	8	4	7.75	+0.1	+1.6
O	SEI CORP	33	15	30.00	-0.8	-2.4
O	SHARED MED SYS CORP	53	28	27.75	-1.8	-5.9
O	SOFTWARE AG SYSTEMS INC	20	10	11.88	-0.3	-2.1
O	SOFTWARE PUBG CORP	17	5	14.75	-1.0	-6.3
A	STERLING SOFTWARE INC	21	9	10.63	-0.1	-1.2
N	SUNGUARD DATA SYSTEMS	21	10	18.50	-1.0	-5.1
N	UCCEL CORP	36	18	32.00	-1.6	-4.8
N	URS CORP	21	13	16.63	-0.5	-2.9
N	VM SOFTWARE INC	45	16	30.50	-2.3	-6.9

Semiconductors

EXCH		52-WEEK RANGE (1)		CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	27	13	20.13	-1.6	-7.5
N	ANALOG DEVICES INC	24	14	21.88	-0.5	-2.2
O	ANALOGIC CORP	13	10	11.13	-0.8	-6.3
N	APPLIED MAGNETICS CORP	40	13	34.63	-3.5	-9.2
O	AVANTEK INC	20	13	13.38	-1.4	-9.3
O	HADCO CORP	7	3	6.00	-0.3	-4.0
O	INTEL CORP	48	16	41.75	-3.0	-6.7
O	MICRO MASK INC	7	2	6.63	-0.1	-1.9
N	MOTOROLA INC	64	34	53.38	-7.9	-12.9
N	NATIONAL SEMICONDUCTOR	17	8	14.13	-0.6	-4.2
N	TERADYNE INC	29	16	25.63	-1.0	-3.8

Peripherals & Subsystems

EXCH		52-WEEK RANGE (1)		CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
A	AM INTL INC	9	5	6.25	-0.3	-3.8
A	ANDERSON JACOBSON INC	4	1	2.25	+0.4	+20.0
O	AST RESH INC	23	11	18.50	-1.0	-5.1
O	AUTOTROL CORP	10	5	9.63	-0.4	-3.8
O	AVANT GARDE COMPUTING	7	3	3.75	-0.1	-3.2
O	BANCTEC INC	14	6	12.50	-1.0	-7.4
N	BOLT BERANEK & NEWMAN	60	37	44.00	-2.5	-5.4
A	CETEC CORP	8	5	5.63	-0.3	-4.3
A	COGNITRONICS CORP	5	2	3.88	-0.3	-6.1
N	COMPUGRAPHIC CORP	24	16	21.38	-0.4	-1.7
N	COMPUTERVISION CORP	23	10	15.50	-2.6	-14.5
N	CONRAC CORP	30	12	27.13	+0.0	+0.0
A	DATAPRODUCTS CORP	18	10	10.25	-1.4	-11.8
A	DATARAM CORP	17	7	7.25	+0.0	+0.0
O	DATA SWITCH CORP	9	5	7.13	-0.8	-9.5
O	DATUM INC	7	4	5.75	+0.1	+2.2
N	DECISION INDS CORP	15	7	7.63	-0.3	-3.2
O	ENDATA INC	10	5	10.13	+0.3	+0.0
O	EMC CORP	34	11	26.75	-0.3	-0.9
O	EVANS & SUTHERLAND	40	20	30.88	-1.4	-4.3
N	FLOATING POINT SYS INC	39	11	10.88	-0.6	-5.4
O	GANDALF TECHNOLOGIES	11	5	8.38	-0.4	-4.3
N	GENERAL DATACOMM IND	15	8	11.63	-1.6	-12.3
O	ICOT CORP	13	5	6.38	-0.1	-1.9
O	INFORMATION INTL INC	18	13	14.00	+0.0	+0.0
O	INTERLEAF INC	20	8	18.38	-1.8	-8.7
O	MEGADATA CORP	7	2	4.88	-0.1	-2.5
A	MSI DATA CORP	17	10	14.38	+0.4	+2.7
N	NASHUA CORP	31	21	27.88	-1.1	-3.9
O	NETWORK SYS CORP	19	9	8.88	-0.1	-1.4
N	NORTH AMERN PHILIPS CORP	46	35	42.50	+0.6	+1.5
N	NORTHERN TELECOM LTD	46	27	36.75	-2.3	-5.8
O	NOVELL INC	27	9	24.25	-1.5	-5.8
N	PARADYNE CORP	11	4	6.25	+0.0	+0.0
A	PENRIL CORP	8	4	4.75	-0.5	-9.5
N	PLESSEY PLC	41	24	40.00	+1.4	+3.6
O	PRINTRONIX INC	14	10	11.75	-0.1	-1.1
N	QMS INC	18	11	14.88	-0.8	-4.8
O	RAMTEK CORP	6	4	4.25	-0.1	-2.9
N	RECOGNITION EQUIP INC	27	10	17.88	-1.8	-8.9
O	SCAN TRON CORP	19	11	11.50	-0.3	-2.1
N	SCIENTIFIC ATLANTA INC	19	9	16.63	-1.3	-7.0
O	SEAGATE TECHNOLOGY	45	10	40.25	-3.8	-8.5
N	STORAGE TECHNOLOGY	5	2	4.25	+0.0	+0.0
O	SUN MICROSYSTEM INC	44	11	42.25	+2.1	+5.3
A	T-BAR INC	8	5	8.00	+0.0	+0.0
A	TAB PRODS CO	21	12	17.88	-0.8	-4.0
O	TANDON CORP	8	2	5.50	-0.1	-2.2
A	TEC INC	6	3	3.25	-0.1	-3.7
N	TEKTRONIX INC	43	27	33.75	-0.5	-1.5
O	TELEVIDEO SYS INC	4	2	2.75	-0.1	-4.3
N	TELEX CORP	102	52	74.00	-5.5	-6.9
N	TIMEPLEX INC	41	14	34.50	-3.6	-9.5
N	TITAN CORP	11	6	6.00	-0.4	-5.9
O	WYSE TECH	33	13	29.63	-2.4	-7.4

Leasing Companies

EXCH		52-WEEK RANGE (1)		CLOSE MAY 20 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	33	15	29.00	-3.9	-11.8
N	CONTINENTAL INFO SYS	13	7	11.13	-0.5	-4.3
O	FINALCO GROUP INC	4	2	2.88	+0.0	+0.0
O	PHOENIX AMERN INC	8	3	5.13	-0.5	-8.9
O	SELECTERM INC	8	5	5.13	+0.0	+0.0
N	U.S. LEASING	53	38	49.50	-2.9	-5.5

EXCH: N = NEW YORK; A = AMERICAN; P = PACIFIC; B = BOSTON; L = NATIONAL; M = MIDWEST; O = OVER-THE-COUNTER; S = SPLIT

Downhill racers

High-tech stocks drop; IBM rides roller coaster

Technology stocks dipped across the board last week, following the lead of a market in which declining issues heavily outnumbered advancing stocks.

IBM, after starting the week at 160⅝, down 4½ points from the previous week, climbed ¾ of a point on Monday but then dropped an additional 4½ points to close at 156¾ on Tuesday.

At the close of business on Thursday, IBM stood at 157¼.

Even financial reports showing increased sales and earnings could not raise share prices on Tuesday for Palo Alto, Calif.-based Hewlett-Packard Co. or Torrance, Calif.-based Ashton-Tate.

HP, with profits of 63 cents per share reported for the second quarter, dropped to 62⅜ on Tuesday, down 1½ points. The stock dropped an additional ⅜ of a point on Wednesday and stood at 62⅜ on Thursday.

Ashton-Tate, which recorded earnings of 36 cents per share, watched its stock fall 1½ points to 24¼ on Tuesday. The stock climbed to 25½ by Thursday but fell short of its 52-week high of 30¼.

ALAN J. RYAN

IBM plans June flood of intros

BY JAMES CONNOLLY
CW STAFF

Even before the dust settled, speculation began last week about which expected products IBM failed to announce and which of them might be introduced in the near future.

Industry observers reported last week that IBM is planning three waves of product introductions, including entirely new systems and minor enhancements, in June.

An official with a company that competes with IBM in the communications field reported that two of the announcement dates are June 2 and 30.

The announcement set for next week reportedly will be communications-oriented, with enhancements to the IBM 3725 and 3720 communications processors being designed to let IBM's Network Control Program (NCP) manage PU2.1 communications on a peer-to-peer network without going through VTAM.

Could leave gaps

But that announcement also reportedly leaves open several holes, the first being that the PU2.1 used in the Advanced Peer-to-Peer Network announced last year for the System/36 and 38 will have to be modified at a later date to be compatible with the NCP's PU2.1. The NCP enhancement also reportedly offers no peer-to-peer help for the IBM 9370 mid-range systems that use VTAM. The only help for 9370 users is said to be a multidrop capability. Other analysts continued to predict a low-end and a high-end 9370 model.

Other June 2 announcements are expected to include IBM VM enhancements to improve the user interface, a high-end version of VM/XA, Token-Ring local-area network modifications to ease setup and installation, 3174 controller enhancements and a new 3192 terminal.

The June 30 announcement reportedly will focus on hardware and software enhancements to the IBM System/88, the fault-tolerant processing system made by Stratus Computer, Inc.

Introductions at NCC?

Meanwhile, officials of the National Computer Conference, which is scheduled for June 15 to 18 in Chicago, report that IBM has scheduled several press conferences for the show. It was at NCC in 1983 that IBM introduced the System/36 and at NCC in 1986 that the company announced new models and communications tools for the System/36 and 38.

Several analysts speculated last week that on June 16, IBM will introduce the long-expected follow-on to the System/36 and 38, which is commonly known as Silverlake. IBM recently told consultants that Silverlake will be based on a 9370 chassis but will run System/38 CPF software and System/36 on plug-in CPU boards. Silverlake systems reportedly could be delivered by the fall if they are announced in June.

In connection with the Silverlake speculation, analysts said IBM is still likely to provide a temporary growth path for System/38 Model 700 users. A key announcement expected in the mainframe arena is a triple-density version of the IBM 3380 disk drive. Dual-density versions now provide 5G bytes of storage. However, analyst opinions were split on whether IBM is ready to announce faster access times, increased cache and faster channel speeds for those drives.

Senior Editor Charles Babcock contributed to this report.

IBM carves

FROM PAGE 1

ing purposes, while the 150E is a "Group 40" machine.

"The graduated pricing is part of a larger strategy to remove software pricing as an issue when considering IBM machines," said Peter Braude, vice-president of the Gartner Group, Inc. in Stamford, Conn.

"Our customers said the cost of our software was inhibiting them from distributing MVS/XA on 4381s," said Peter N. Clough, administrator of large systems marketing for the IBM Information Systems Group in Rye Brook, N.Y.

In addition to graduated MVS/XA pricing, IBM introduced four 4381 models that offer significant price/performance improvements. The cost per million instructions per second (MIPS) on a new 4381 Model 23 is estimated to have dropped to $110,000, compared with $118,000 for its predecessor.

On the new low-end 3090 Model 120E, the price for a basic system configuration dropped to $985,000 from $1.65 million for the former low-end Model 150E. Both of the new processors fall into the Group 30 tier, meaning their users could add an additional $200,000 savings to the expense of MVS/XA during a four-year period, IBM officials said.

Another IBM goal of the improved pricing structure for mid-range mainframe users is to encourage VSE operating system customers to move to MVS/XA.

In case anybody did not get the hint from the pricing incentives, IBM announced a repackaged software unit plus services, known as a Solutionpac, for migrating from its older VSE operating system to MVS/XA. "It's a major attempt by IBM to get VSE players to play MVS/XA ball," said Peter L. Burris, analyst with International Data Corp. (IDC), a market research firm in Framingham, Mass.

An estimated 33% of the 27,000 IBM mainframe sites in the U.S. were running VSE at the end of 1986, according to figures released by IDC. An even higher 37% of the large mainframes likely to serve as platforms for MVS/XA still run VSE, according to IDC.

With the graduated pricing scheme, a user of the new 4381 Model 23 can run MVS/XA during a four-year period at a price of $392,790, a $200,000 saving over the previous one-price-tag-suits-all pricing structure.

On the other hand, the users of 3090 Model 200 mainframes or larger machines will find the price of MVS/XA is $626,620 for four years, or $34,000 higher than it used to be, IBM pricing figures indicated.

Brown said IBM's desire to migrate VSE users to MVS/XA is a warning that VSE has a limited future. "This is a glaring red traffic light saying VSE is not going to be supported in a few years," Brown said.

Those users can stay with VSE for as long as possible at the risk of being left without future operating system enhancements, shift to MVS/XA — with its related system operator and software expenses — or search for another vendor, Brown said.

"It's got to be a hell of an organizational drag on IBM. Every time it considers a future direction, those 9,000 VSE customers have to be considered," IDC's Burris said.

Follow-up to '86

The graduated pricing announcement was seen by analysts and customers as a follow-up to IBM's announcement in October 1986 of graduated pricing for VSE and VM. Prior to that announcement, IBM had set one price for its software — regardless of the size of the mainframe on which it ran.

In another pricing innovation, IBM introduced volume discounts for VM and VSE in October 1986 and after Tuesday's announcement will offer substantial savings to MVS/XA customers as well.

Ordering the operating system in a quantity of three yields an automatic 10% discount, Clough said. An order of five gives the customer a 15% discount; 10, a 20% discount and 20, a 25% discount, he said.

An additional saving is offered to non-MVS customers who decide to migrate to MVS/XA. Migrators can deduct 25% off the graduated charge for MVS/XA, or they can sign up for a migration assistance package that waives the initial license charge and monthly fees for eight months. At the end of eight months, the user pays the charge and 50% of the monthly fees during the next 12 months.

"We've narrowed the gap a lot between VSE and XA," Clough said. He said the typical VSE user also uses the VM operating system and pays out $366,000 during a four-year period. MVS/XA on a 4381 prior to Tuesday's announcement cost $677,000 during the same period. A typical configuration now would be licensed for $458,000.

Pricing on the high end of the new hardware introductions, the 3090 Model 120E, was set at a minimum of $715,000 for the processor and $120,000 for the 3092 Model 3 controller. IBM officials said a base price for the processor complex is $985,000. That compares with the previous low-end price of $1.6 million for the Model 150E.

Another observer who warned that the 3090 Model 120E could be a trap was Svend E. Hartmann, president of Computer Merchants, Inc., a Chappaqua, N.Y., computer sales and leasing company.

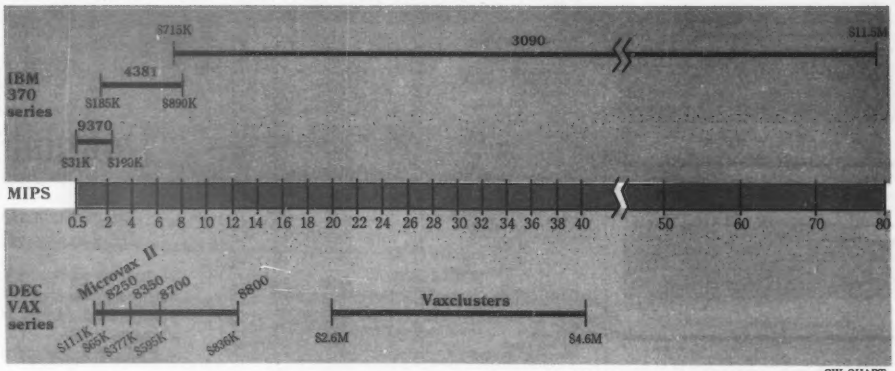
"It's always been tough to know what is going to happen with these low-end, low-priced machines. Whenever you look at them, they turn out to be very bad buys when you turn around and try to sell them on the used market a few years later," Hartmann said.

He compared the Model 120E with other low-end machines added to processor families at mid-life, which became outdated by the time users were ready to upgrade them to more powerful models.

"The thinking that IBM wants you to adopt is that you can start with this model and upgrade it a year or so later," said Hartmann, who tracks used computer values. "The problem is that new machines come online faster than you can upgrade or need the excess capacity," Hartmann added.

Hatfields and McCoys

DEC's boast of one architecture benefit comes under assault of IBM 370 series



CW CHART

DB2, SQL/DS upgrades join relational family

BY CHARLES BABCOCK
CW STAFF

NEW YORK — IBM's Release 3.0 of its fast-growing DB2 data base management system offered few impressive technical innovations when announced last week, but it illustrated how IBM is trying to build up its "family" of relational software.

The primary DB2 enhancements included a catalog extension, dubbed a directory; support for time, date and time stamp data types; an increase in the maximum DB2 buffer pool size ; and support for floating-point data of single-byte precision.

At the same time, IBM said DB2's second cousin, SQL/DS, the relational product for the VM and VSE operating systems, has been made "more consistent with DB2" and that the SQL used with both has been brought into closer kinship.

"Complex queries will still yield different results in some circumstances, but we can tell you when. We are managing any differences out of the two products," said IBM's Russell T. Donovan, data base products marketing manager. The data access manager was rewritten for Version 2.1 of SQL/DS to make it function more like DB2, Donovan said.

Both Version 2.1 of SQL/DS and the new Version 2.2 of IBM's Query Management Facility (QMF) will support the time, date, time stamp and single-byte precision floating-point data types, as well as DB2. A single-byte precision data element can be limited to seven characters; in the past, DB2 required double-byte precision data elements requiring 15 characters each.

Save our space

"That's going to save us a lot of DASD space," said a large-system user of DB2 in Chicago.

"What you see are all the canaries singing at one time," said Michael Braude, vice-president of the Gartner Group, Inc., a market research firm in Stamford, Conn. In the past, IBM has not treated its relational products as a related group, nor has the company attempted to upgrade them concurrently, he said.

Although the SQL used for SQL/DS and DB2 still does not fully comply with the ANSI standard for SQL, Donovan said it is now "much closer" to that standard. IBM first referred to its family of relational products with the announcement of a new operating system for its Personal System/2 family of personal computers. OS/2 Extended Edition will have a relational DBMS that will also be "consistent with DB2," IBM said in April.

In addition, IBM attempted to further widen the appeal of DB2 by providing a VSAM transparency package that would allow customers to move VSAM data into DB2 but continue to run VSAM-based applications.

Automating DASD control

IBM enhances system-managed storage products. Page 110.

IBM spokesmen said many DB2 users still rely on aging VSAM applications "that they could never justify converting." The transparency software, priced at $11,000 and set to be available in March 1988, will help them to make the transition to DB2 without rewriting, recompiling and relinking and editing the programs, Donovan said.

The $14,000 directory, which will function for both DB2 and SQL/DS, will extend the system catalog and was "clearly designed to answer some of the criticisms of DB2's not having a data dictionary," said David G. McKay, senior consultant with Knauer Consulting, Inc.

IBM's Donovan termed it a "tactical solution needed today," but not the long-term solution needed to provide referential integrity and other integrity controls over the DBMS. The directory will consist of DB2 tables devoted to system use that can contain data types, objects and table definitions. It will be interactive with users through IBM's Interactive System Productivity Facility screens. Any changes made to the directory will require the tables to be locked, and Donovan said IBM decided the locking should be limited to the directory. Locking DB2 catalogs could interfere with system processing, another obstacle that must be overcome before IBM can field an active data dictionary, other observers said.

Short life span?

"This product [the directory] is going to have a short life," Braude predicted.

The DB2 version is slated to be available in September, while the SQL/DS version is slated for March 1988.

In addition, IBM announced the following:

- Version 2.2 of Data Extract, which removes data from IMS and VSAM files and loads it into DB2 or SQL/DS files, or vice versa. The release supports the new data types in DB2 and SQL/DS. Priced at $300 a month, it is set to be available June 26.
- A tool for data base application development, marketed as part of IBM's Solutionpac. The package includes on-site training in the use of IBM's fourth-generation language, Cross System Product (CSP), to develop applications for DB2 or SQL/DS. Data base software, CSP and QMF are included in the package, priced at $74,200 under MVS and $72,200 under VM/VSE. It is scheduled to be available in October.
- Release 4.0 of TSO Extensions, a teleprocessing monitor for MVS/XA, with new exits, restructured library and application installation and menu management aid. Priced at $1,500 for an initial license and $555 a month, it is set to be available Sept. 25.
- Query.DL/1 allows on-line access to data in DL/1 data bases directly from the IMS/DS and CICS transaction processing environments. Priced at $14,400 under DOS or VSE and $24,400 under MVS, it is set to be available June 26.

IBM CPUs

FROM PAGE 1

International Data Corp. in Framingham, Mass.

"There was pressure on IBM to provide the air-cooled contingent some place to go," Mikita added, referring to users of the air-cooled 4381s. "They weren't successful drawing them to the water-cooled 3090s."

In filling the performance gap, IBM also appeared to aim at the market for used 3080 models, said Rick Martin, an analyst with Sanford C. Bernstein & Co. in New York. The 3081 average price was $700,000 to $1 million for a machine that performs 8 million instructions per second — precisely the price/performance range targeted by the new processors, Martin said.

Analysts agreed that the new models give the 4381 line about two more years of life. "They have to leave the 4381 alone for a couple of years," said Per Flaatten of Arthur Andersen & Co. in Chicago.

Oscar Rothenbuecher of Arthur D. Little, Inc. in Cambridge, Mass., predicted, "The 4381 will be replaced, more likely in 1989, because the system architecture will run up against limitations in storage."

In an attempt to stimulate demand for the new processors, IBM announced two incentive programs and a price cut of 5% to 9% on existing 4381s.

In a two-stage shipment plan that continues the upgrade policy announced with the 3090E models earlier this year, IBM will ship either a Model 11, 12, 13 or 14 to customers ordering the new models until Nov. 30. A conversion kit will be delivered in the first quarter of 1988 to upgrade the processor's performance. Those ordering according to this plan will get discounts from $20,000 to $75,000.

Upgrades in '88

Upgrades for users who wish to convert their present 4381 to one of the new models will also be available in the first quarter of 1988, according to IBM.

In addition, IBM is allowing customers to pay for a 3090 Model 120E or 150E six months after the date of installation. The Model 120E will be available in October, IBM said. IBM claimed the new 4381s have 30% faster throughput in commercial applications than current models and are 12% faster in engineering or scientific work.

Although IBM said it would continue to market 4381 Models 11, 12, 13 and 14, analysts expect the firm to eventually discontinue those processors because the Models 22 and 23 offer better price/performance.

Bob Smith, data center manager for Rosemount, Inc. in Eden Prairie, Minn., welcomes the new products because they allow him room to grow. Smith said his shop has been nearing capacity on Models 13 and 14, but with the announcements, he said he can now see 65% to 70% possible growth with an extended life span of two to three years.

Smith, who is now using 32M bytes of memory on both systems, said he is pleased that he can increase to 40M and 64M bytes, respectively. The upgrade price seems cost-effective and is "much better than going to a 3090," Smith added. IBM lists upgrades from Model 14 to Model 24 at prices ranging from $260,000 to $500,000.

Of the new 4381s, Models 21, 22 and 23 are uniprocessors, and the Model 24 is a dual processor. All run the full complement of 370 operating systems.

The 4381 Models 22, 23 and 24 use IBM's faster, second-generation 1M-bit random-access memory, which allows the latter two systems to offer up to 64M bytes of main memory, double the memory capacity of existing units. The two high-end systems also feature faster cycle times of 52 nsec, IBM said.

IBM is offering a serial interface, previously available on the 9370 and 4361, to allow other vendors' equipment to attach to the new 4381s. Moreover, the entry-level model can be equipped with up to 12 3M-byte I/O channels, while the Model 24 can be configured with up to 24 channels. Earlier models could only support up to 12 channels, only four of which handled 3M-bit data rates.

The 3090 Model 120E, which is field upgradable to the Model 150E, uses the same 1M-bit technology and thermal conduction module used in other 3090E series models, IBM said. The processor supports 32M bytes of main storage, which is expandable up to 128M bytes. The base configuration includes 16 channels operating at 32M bytes and can be expanded to 24 channels.

IBM is offering an optional vector facility for $325,000 that is said to provide 2.2 to 6.1 times the system's scalar performance.

While analysts predict a bright market future for the new 4381s, they are somewhat less optimistic about the 3090 120E. "The question is, 'Is it doomed to repeat the 3083 CX history?,' " IDC's Mikita asked. "It probably will not do much better than the CX. There was overlap before with the 4381 and the 3083 CX before" this announcement.

Martin of Sanford Bernstein added, "I wouldn't expect the 3090 Model E to be a barn burner, but the 4381s will sell like hotcakes."

IBM moves

Offerings fill and extend mid-range

4381 models

Old			New		
Model	MIPS*	Price	Model	MIPS	Price
11	1.5	$185,000	21	2.3	$225,000
12	2.8	$330,000	22	3.3	$350,000
13	3.5	$440,000	23	4.7	$530,000
14	6	$850,000	24	7.8	$890,000

(Each in suggested basic configurations)

3090 models

New low-end 3090 120E compared with previous low-end 3090 150E

Model	MIPS	Price	Model	MIPS	Price
150E	10.1	$1.65M	120E	7.5	$985,000

(Each in suggested basic configurations)
* Million instructions per second

CW CHART

IBM storage tools enhanced

Boosted system-managed software cuts needed DASD-related manpower

BY JAMES CONNOLLY
CW STAFF

RYE BROOK, N.Y. — IBM took another step last week in its 5-year plan to minimize operator involvement in disk management with the announcement of enhanced disk-backup and space-allocation software.

That plan for system-managed storage, which is IBM's response to 1984 requests by IBM users groups Guide International Corp. and Share, Inc., calls for storage automation to reduce the number of operators needed for direct-access storage device (DASD) management and to improve DASD planning.

The announced releases of IBM's Data Facility Data Set Services (DFDSS) and Data Facility Hierarchical Storage Manager (DFHSM) are apparently meant to strengthen IBM's position in competition with third-party software vendors such as Sterling Software, Inc. and Uccel Corp., which provide data storage management utilities.

DFDSS Version 2, Release 3 reportedly includes support for the interactive storage management facility (ISMF) of IBM's MVS/XA Data Facility Product. With ISMF, DFDSS provides specific disk-volume support for commands such as copy, dump, restore, release and compress, plus specific data sets, according to James Garner, IBM senior market support representative.

Garner said DFDSS now automates defragmentation or consolidation of DASD volumes, allowing users to better utilize disk space. That capability is particularly important in active volumes, in which the constant addition and removal of data sets tends to leave unutilized disk space.

The new release of DFDSS is also intended to make it easier to move data from one device type to another, such as from an IBM 3380 disk drive to an IBM 3350 drive. The release also supports the VSAM linear data sets introduced by IBM last year.

IBM claimed a 40% performance gain in copying sequential and partitioned data sets from a 3350 to a 3380 in one comparison between DFDSS Version 2, Release 3 and Release 2.

DFHSM Version 2, Release 3 and DFDSS working together reportedly transform manual volume-dump operations into automated dump and incremental backup functions. IBM said DFHSM now supports use of DFDSS for physical volume dumps and incremental backup, volume restore and incremental recover and data set restore and recover. It also features support for the IBM 3480 Models A11 and B11 tape drives. It had previously supported only the 3480 Models A22 and B22.

Don Murphy, vice-president for sales and marketing with the Sterling Software Marketing division of Sterling Software, noted that IBM made progress with its data storage management announcements. But, he added, "The IBM products are now coming up to speed with products we were selling six or seven years ago."

He also claimed that companies such as his have a built-in advantage against IBM. "We're in the business of saving people DASD space. IBM is in the business of selling it," Murphy said.

Fred Moore, marketing director of Storage Technology Corp., in Louisville, Colo., reported storage management is a growing concern but that only 10% of the large-system user base currently manages its own storage, although 60% of all large MIS shops of those users have installed storage management software.

Murphy added, "A discouraging percentage of people are doing storage management, and that's because they keep throwing hardware at their problems. One thing that helps us is that at least IBM is talking about system-managed storage now. They are blessing it."

3Com claims easy 386 migration

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — 3Com Corp. has good news for the owners of 8,000 of its 3Server3s: Server migration of the Intel Corp. 80386 processor and the Microsoft Corp. MS OS/2 and LAN Manager will be fairly painless and will not make the installed base obsolete.

Users of 3Com's current 186-based 3Server3s can expect to support Microsoft's MS-DOS and MS OS/2 and Apple Computer, Inc.'s Macintosh workstations, according to 3Com Chairman Robert Metcalfe. He also promised users the following:

- 3Server3s shipping today will be able to support MS OS/2 and the LAN Manager with little or no software modifications.
- 3Com will provide a hardware upgrade to allow 3Server3s to migrate to the 386 standard and support MS OS/2. "The purpose of the 386 upgrade is to allow the customer to run server-based applications under [MS] OS/2," Metcalfe said, adding that he expects such applications to appear around mid-1988. He did not give a delivery date.
- Advanced 3System, a high-end 386-based file server with a much larger disk and greater computing power, will be available in late 1987.

In addition, users who buy a new 3Server3 to replace an existing personal computer-based server will reportedly be able to trade in their 3Plus for PC server or any other network operating system for 3Plus for 3Server3 until Aug. 31.

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Computerworld (ISSN-0010-4841) is published weekly, except: January (5 issues), February (5 issues), March (6 issues), April (5 issues), May (5 issues), June (6 issues), July (5 issues), August (6 issues), September (5 issues), October (5 issues), November (6 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.

Computerworld can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

Subscription rates: $2.00 a copy: U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

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INSIDE LINES

It's a natural. Microsoft has plunked $1 million into Natural Language, Inc. and has an agreement to use that firm's natural-language interface for SQL-based data bases in an unannounced Microsoft product. The deal is set to be announced in early June.

Back from the brink. Storage Technology expects to end its 2½-year exile to Chapter 11 on June 18. That's when the company hopes a bankruptcy court judge will approve the disk and tape drive vendor's plan of reorganization. In conjunction with that motion, Storage Technology last week executed a $50 million line of credit with six financial institutions for backup funding and bridge financing.

Mainframe software seeks good home. Nomad2 is roaming the software desert in search of a home. Reports are surfacing in volume that D&B Computer Services is looking for a buyer for the erstwhile fourth-generation language, which is one of the oldest on the market but which has been spiffed up recently with a new interface and IBM DB2 compatibility. D&B has been shopping Nomad2 around to some big-name mainframe and even micro software players, but no one has yet agreed to adopt the software or its reported $15 million to $20 million price tag.

Canaan's last stand? Following layoffs and restructuring one month ago, Canaan Computer seems to have taken a turn for the worse. The firm's management team has been replaced by personnel from the company's lead investor, Hambrecht & Quist. Jerry Burk of H & Q is currently president, and Mike Preletz now CEO, of Canaan. A source close to the company also says only 16 employees remain at the Trumbull, Conn., manufacturer of VM/CMS-based departmental computers. Canaan has been in the red since its founding in 1981. It had apparently targeted a vacant market niche — until IBM announced its 9370 departmental processor last fall.

Never clone alone. The latest word on Novell's efforts to port Advanced Netware to the Intel 80386 operating environment goes like this: Novell is building an environment consisting of Advanced Netware/386 integrated with PC-MOS from The Software Link and Desqview, the Microsoft Windows-compatible environment from Quarterdeck Office Systems. Novell also intends to graft Softcraft's Btreive and IBM gateways from CXI into Netware. The result — network and 386 operating systems with built in connectivity and data base support — should sound pretty familiar to fans of IBM's OS/2 and OS/Extended.

Just don't call customer support. Sources have spotted copies of the original Visicalc for sale at Lechmere, an East Coast department store chain. And incredibly, the package is still sporting its full list price. It looks and feels like customers get burned on this one.

Might as well announce 'em. Wang Laboratories, Inc. this week will formally announce microcomputers that have already been shipping to customers. The machines comprise an entirely new line of Intel 80286 and 80386 micros that solve the hardware compatability problems of Wang's earlier PC line, which will remain on the market.

$99 and words to boot. Lifetree Software will this week cut the price of Word & Figures in half to $99. The product, a Lotus 1-2-3 clone with built-in word processing, is not currently the target of Lotus attorneys and has recieved rave reviews. Sales to large accounts, however, have suffered due to the specter of a possible look-and-feel lawsuit.

Say what? Reports comparing IBM and DEC are springing up everywhere these days, and it's a comparison that IBM apparently is not taking lightly. Not only is IBM offering bonuses to sales staff selling into DEC accounts, but IBM has begun to "bad-mouth" DEC in sessions with end users, an MIS director with a Fortune 100 company reports. "It's almost a paranoia with them," he says. DEC can consider IBM's wrath a left-handed compliment, though, the user says, noting that Big Blue reps still refuse to acknowledge that vendors like Wang, DG and HP even exist.

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